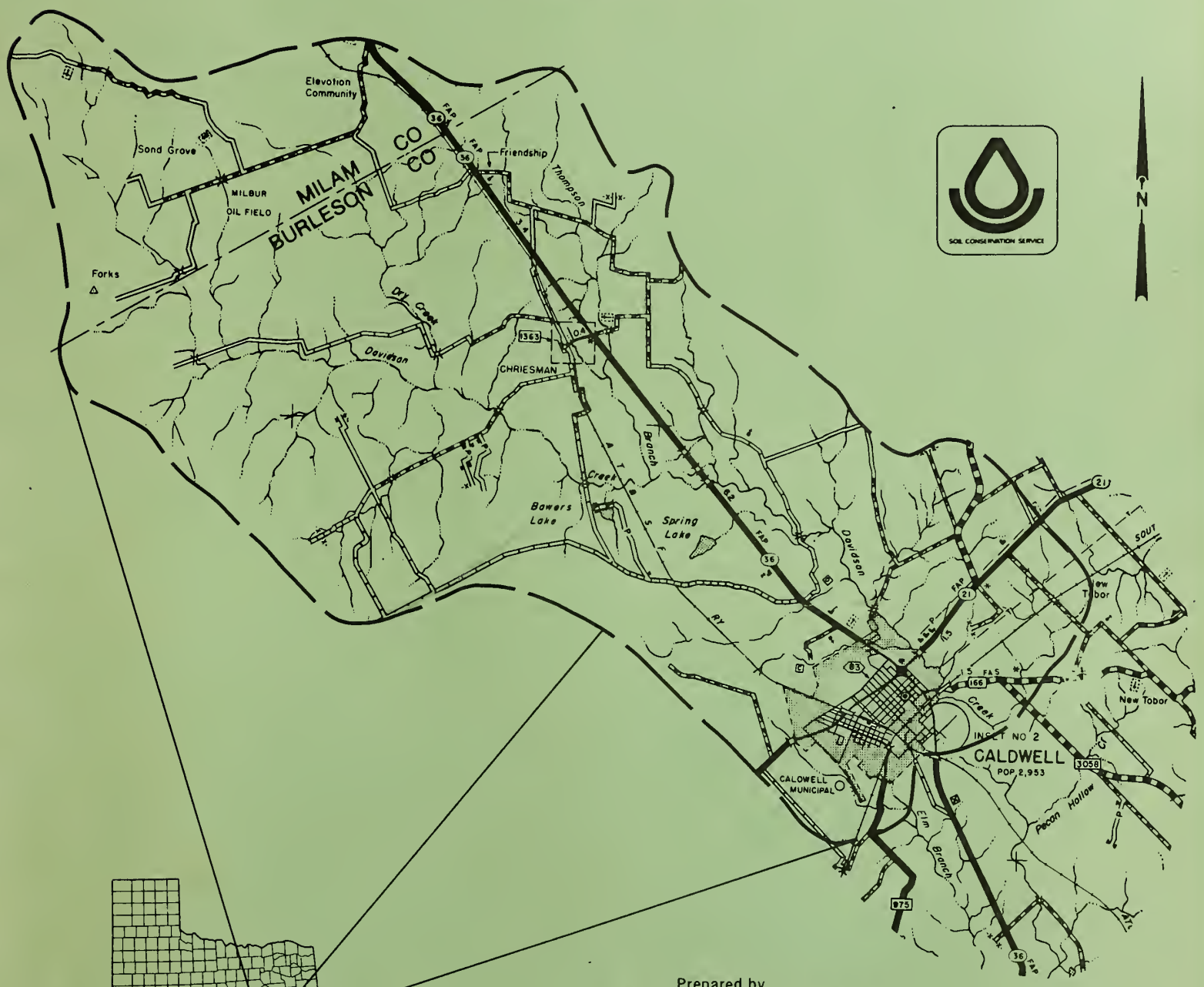
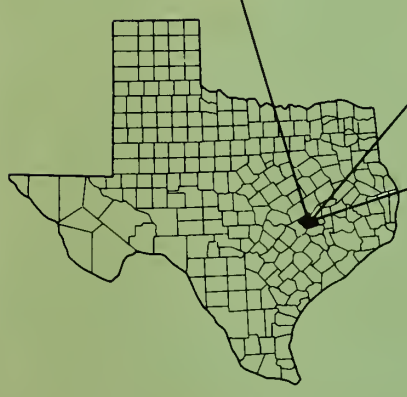
DAVIDSON CREEK AND TRIBUTARIES

FLOOD PLAIN MANAGEMENT STUDY

BURLESON COUNTY, TEXAS





KEY TO COUNTIES

Prepared by
UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
Temple, Texas

in cooperation with
BURLESON-LEE SOIL AND WATER CONSERVATION DISTRICT
BURLESON COUNTY COMMISSIONERS COURT
CITY OF CALDWELL
and the
TEXAS WATER COMMISSION

April 1987

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INTRODUCTION

This flood plain management study report identifies areas of flood plain subject to flooding by Davidson Creek and Tributaries within the city of Caldwell and vicinity, Burleson County, Texas.

The assistance and cooperation given by the agencies, organizations and individuals during the Davidson Creek and Tributaries Flood Plain Management Study is greatly appreciated. These include:

-- Burleson-Lee Soil and Water Conservation District
-- City of Caldwell
-- Burleson County Commissioners Court

Special appreciation is extended to the individuals who contributed information for the study. Appreciation is also extended to the landowners who permitted access to their property for surveys, photographs, and reconnaissance.

It was estimated that 96 residences, 21 businesses, and 35 public buildings are located in areas subject to flooding. Minor or nuisance type flooding occurs several times each year. Severe floods causing extensive damages occurred in 1921, 1947, 1965, 1969, and in March 1983 and again in May 1983.

The center of Davidson Creek channel is presently the east boundary of the Caldwell city limit. Tributaries to Davidson Creek flow through the present city limit of Caldwell. Texas State Highway 36, a major northwest-southeast traffic artery, parallels Davidson Creek through the city of Caldwell. Texas State Highway 21, a major southwest-northeast traffic artery, crosses Davidson Creek in the city of Caldwell.

The City of Caldwell experiences frequent flooding along both Highway 36 and Highway 21 from tributaries draining into Davidson Creek. Less frequent, but more serious flooding results when flooding occurs on the main stem of Davidson Creek. Approximately 20 buildings suffered flood damage in 1983.

The City of Caldwell continues to experience rapid growth and expansion. Business buildings constructed within or adjoining the Davidson Creek flood plain in 1983 included a large discount store, a motel and others.

A new high school was recently constructed east of Davidson Creek. Residential construction along a major tributary of Davidson Creek in this area is expected to be stimulated by the high school location. New residential developments are presently underway along other Davidson Creek tributaries. Future development is expected to continue to occur within and adjacent to the Davidson Creek and tributaries flood plains.

The City of Caldwell is presently in the emergency flood insurance program; however, no detailed flood insurance study has been made.

The City of Caldwell, Burleson County, and Burleson-Lee SWCD will use this study as a factual basis for implementing flood plain management programs to reduce future flood damages.

The study was conducted according to the April 1984 Plan of Work developed and endorsed by the above named requesting entities and the Soil Conservation Service (SCS).

The SCS conducts cooperative flood plain management studies in Texas through the November 1973 Joint Coordination Agreement (Revised 2/27/86) between the SCS and the Texas Department of Water Resources 1/. SCS assists state agencies and communities in the development, revision, and implementation of their flood plain management programs by carrying out cooperative flood plain management studies (FPMS's) in accordance with Federal Level Recommendation 3 of "A Unified National Program for Flood Plain Management," and Section 6 of Public Law 83-566. The principles contained in Executive Order 11988, Flood Plain Management, are addressed in this part.

Topographic data for this study were obtained from field surveys and Geological Survey topographic maps. Rainfall frequency data were obtained from Weather Bureau Technical Paper No. 40, Rainfall Frequency Atlas of the United States. Peak discharge values were obtained using U.S. Geological Survey Water Resources Investigations 77-110 Open File

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1/ Changed to Texas Water Commission in 1985 by the 69th Texas Legislature.

Report, "Technique for Estimating the Magnitude and Frequency of Floods in Texas." Water surface profiles were developed by the Modified Slope Area Method using SCS Technical Release No. 61, WSP2, A Computer Program for Determining Flood Elevations and Flood Areas for Certain Flow Rates.

DESCRIPTION OF STUDY AREA

The study area includes the reach of Davidson Creek main stem and five of its tributaries which flow through or adjacent to the city of Caldwell.

Davidson Creek heads in Milam County approximately 14.2 miles northwest of the Caldwell city limit and flows in a southeasterly direction along the east city limit of Caldwell. It exits from Caldwell and continues in a southeasterly direction to its confluence with Yegua Creek east of Somerville, Texas, which drains into the Brazos River. Davidson Creek Tributary 1 heads approximately 2.5 miles northeast of the Caldwell city limit and flows in a southwesterly direction to its confluence with Davidson Creek approximately 0.8 mile south of Caldwell city limit. Davidson Creek Tributary 2 heads near the Santa Fe Railroad in the southwest part of Caldwell and flows through town in a northerly direction to its confluence with Davidson Creek at the northeast corner of the city limit. Copperas Hollow Creek heads approximately 1.3 miles west of the northwest Caldwell city limit and flows in an easterly direction to its confluence with Davidson Creek near the northeast corner of Caldwell city limit. Elm Branch heads approximately 0.8 mile

west of the northwest Caldwell city limit and flows in a southeasterly direction to its confluence with Davidson Creek approximately 4.1 miles southeast of Caldwell. Elm Branch Tributary 1 heads near the Santa Fe Railroad approximately 0.2 mile west, northwest of the northwest Caldwell city limit. It flows in a southeasterly direction through the western part of Caldwell to its confluence with Elm Branch approximately 0.4 mile south of the southwest corner of Caldwell city limit. The Davidson Creek and Tributaries watershed study area has a drainage area of 76 square miles or 48,640 acres.

The City of Caldwell is the only community center in the study area. The 1980 Census gives the population of Caldwell as 2,953.

The area studied in detail included the flood plains of Davidson Creek - 3.0 miles; Davidson Creek Tributary 1 - 2.5 miles; Davidson Creek Tributary 2 - 0.7 mile; Copperas Hollow Creek - 2.5 miles; Elm Branch - 2.0 miles; and Elm Branch Tributary 1 - 1.6 miles.

The Index and Study Area Map, Appendix, page 7, shows the streams and areas that were studied. The total channel length of stream reaches that were studied in detail is 12.3 miles.

The study area watershed has a moist subhumid climate with moderate temperatures. The winters are mild with a January average minimum temperature of 38 degrees Fahrenheit. The July average maximum

temperature is 94 degrees Fahrenheit. The mean annual rainfall is 37.45 inches with an irregular seasonal distribution. The average growing season is 275 days.

NATURAL VALUES

This study area is located in the Post Oak Savannah Vegetational Area as described by F. W. Gould in Texas Plants -- A Checklist and Ecological Summary.

The Post Oak Savannah in its climax condition consisted of mid and tall grasses with scattered woody vegetation. The woody vegetation covered 15-20 percent of the area with grasses dominating the remaining areas. Major woody species included post oak, blackjack oak, elm and hackberry. Little bluestem, Indiangrass, and brownseed paspalum made up 60 percent of the grasses. Other grasses, forbs, legumes, woody shrubs and vines were also present.

Much of the vegetation has changed from its climax condition. It was broken out and cropped for years. Recently, with crop prices low, cropland has been left idle, and native vegetation is returning.

Present land use is shown in the following table.

TABLE 1

PRESENT LAND USE

DAVIDSON CREEK AND TRIBUTARIES

Land Use	Acres	Percent of Study Area
Cropland	950	2
Pastureland	4,850	10
Open Rangeland	17,880	36
Wooded Rangeland	21,800	45
Water and Wetlands	350	1
Urban	2,800	6
Total	48,630	100

Presently, cropland comprises 2 percent of the watershed. Most of the land previously cropped has been allowed to revert back to rangeland. Major crops being grown are small grain, corn, grain sorghum, and garden crops such as watermelons.

Pastureland represents 10 percent of the area. The grasses commonly being introduced are coastal bermuda, kleingrass, weeping lovegrass and bahia.

Open rangeland covers 36 percent of the study area. Most of this area has been cropped in the past. The present condition on this abandoned cropland is poor to fair. Vegetation found on this area is winter

annual grasses and forbs, Texas wintergrass, rescue grass, threeawn, silver bluestem, ragweed, various species of panicums and dropseeds. Also, mesquite has invaded some of these areas. Vegetation on rangeland in good condition includes many of the climax dominant species such as little bluestem, Indiangrass and paspalum.

Wooded rangeland, which includes both the upland and bottom land hardwoods, makeup 45 percent of the study area. Upland hardwoods are post oak-blackjack oak association. Other species in this association include elm, hackberry, hawthorns, yaupon, greenbriar, grape, and berry vines.

Vegetative species found in the bottom land are pecan, elm, hackberry, water oak, post oak, ash, hawthorn, yaupon, and various species of woody vines.

Water which includes farm ponds, small lakes, and Type 3 wetlands covers approximately 400 acres or 1 percent of the study area.

Urban land use is composed of the cities of Caldwell and Chriesman, and highways involve 6 percent of the area.

PRIME FARMLAND SOILS

Presently, the soils in Burleson and Milam Counties are being mapped. The soil survey for Burleson County is scheduled to be published in 1991 and Milam County in 1989.

The general soil survey for Burleson County and Milam County shows seven soil associations to occur within the study area. They are:

Soil Association	Percent
Tabor-Axtell	1
Padina-Demona	52
Padina-Arenosa	6
Wilson-Crockett	1
Heiden-Wilson	15
Rosanky-Blum	11
Padina-Demona-Silstid	14
Total	100

Two of these associations Heiden-Wilson and Rosanky-Blum have prime farmland soils. When the detail soil surveys are published, these soils may change.

FISH AND WILDLIFE HABITAT

The fishery resource in the study area is restricted to farm ponds, since the streams have ephemeral flow. The principal species of fish in

these impoundments are largemouth bass, channel catfish, bullhead catfish, and various species of sunfish.

The wildlife resources in the study area are associated with the Post Oak Savannah Vegetational Area. However, the woody vegetation has increased in this area. The interspersion of woodlands with the other land uses allows for a greater diversity of wildlife to inhabit the study area.

The principal game species in the watershed are mourning dove, bobwhite quail, and white-tailed deer. Waterfowl occur on water impoundments during their winter stay.

Predator species include coyotes, bobcat and various species of raptors. The principal furbearers in this area are raccoon, opossum, skunk, gray fox, red fox, mink, and beaver. Other species in the watershed are cottontail rabbit, swamp rabbit, jackrabbit and a large variety of songbirds and rodents.

THREATENED AND ENDANGERED SPECIES

This watershed is in the range of occurrence of possibly five species, which have been designated by the U.S. Fish and Wildlife Service as being endangered or threatened.

The following is a listing of species and their status that may occur in the study area.

Common Name	Scientific Name	Status
Artic Peregrine Falcon	Falco peregrinus tundrius	Threatened
American Peregrine Falcon	F. p. anatum	Endangered
Bald Eagle	Haliaeetus leucocephalus	Endangered
Whooping Crane	Grus americana	Endangered
Houston Toad	Bufo houstonensis	Endangered

The Artic Peregrine Falcon, American Peregrine Falcon, Bald Eagle, and Whooping Crane are migrant species and may migrate through this area. The Bald Eagle has been recorded as wintering in Burleson County. The Houston Toad may occur in the study area. It's present range includes Lake Woodrow and vicinity in Burleson County which is east of the study area. This species prefers areas with sandy soils which are heavily wooded (loblolly pine and/or mixed deciduous) interspersed with open grassy fields.

WETLANDS

Wetland types observed in the study area were Type 3 (inland shallow fresh marshes), Type 5 (inland open freshwater), and Type 6 (shrub swamps) as defined by the U. S. Fish and Wildlife Service Circular 39 (Wetlands of the United States).

Approximately 70 acres of Type 3; 20 acres of Type 5, and 30 acres of Type 6 wetlands are found in the study area. The 20 acres of Type 5 wetland occur in farm ponds which are 10 feet or less in depth and are bordered by emergent aquatic vegetation.

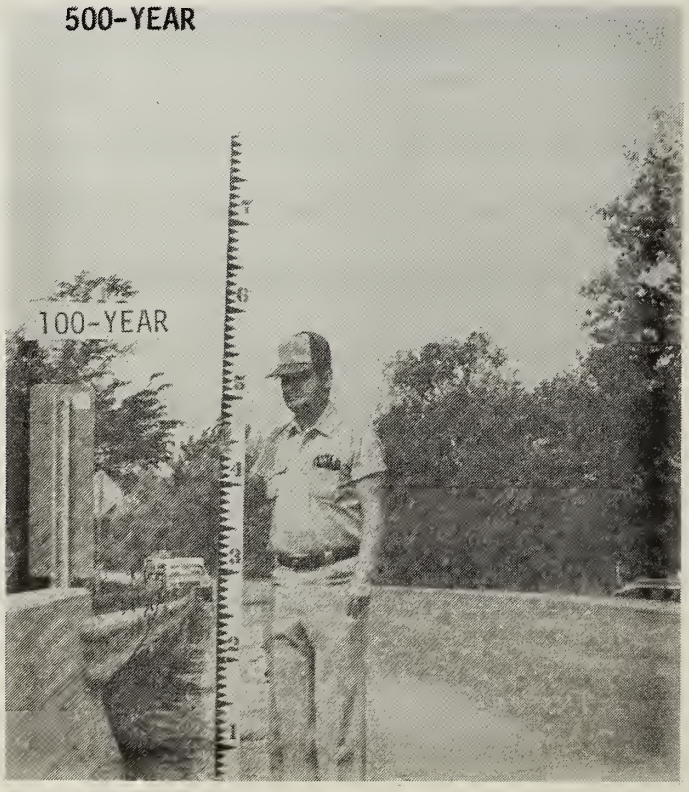
FLOOD PROBLEMS

Floods from Davidson Creek and Tributaries damage residences, businesses, other buildings, streets and highways in the city of Caldwell. Approximately 131 buildings would be affected by the 500-year frequency flood. These 131 buildings with contents have an estimated value of $5,052,750. Approximately 86 buildings would be affected by the 100-year flood. These 86 buildings with contents have an estimated value of $4,022,500.

In addition to the areas affected by overbank flooding from the streams studied, other areas are affected by minor or nuisance type flooding caused by trapped local runoff water due to poor surface drainage.

Potential flood heights for 100-year and 500-year floods photographed at various locations to illustrate the flood problems are shown on pages 12 to 14, Figures 1 through 5.

FIGURE 1 -- Potential flood heights on cross section 7 at west end of bridge over Davidson Creek on FM 166.



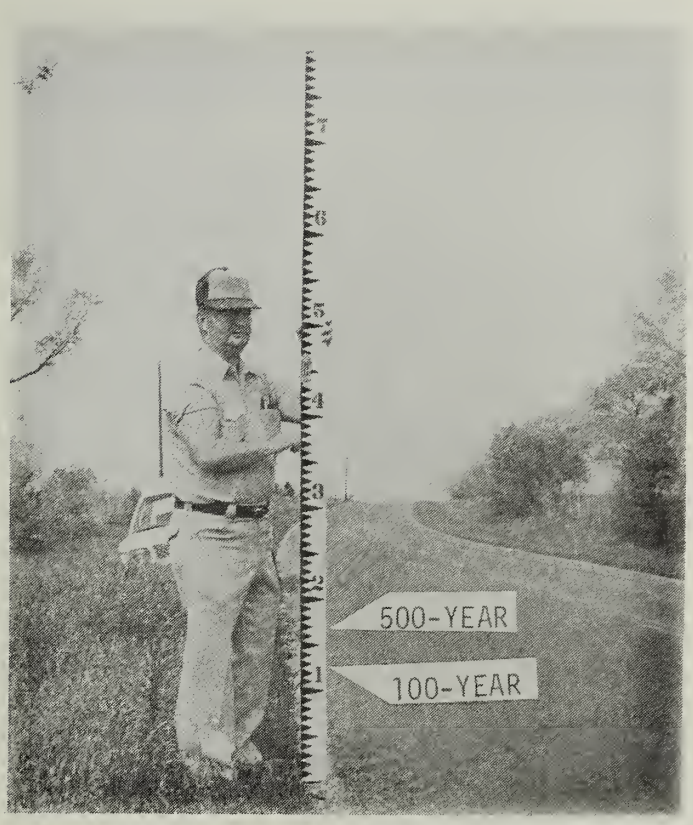
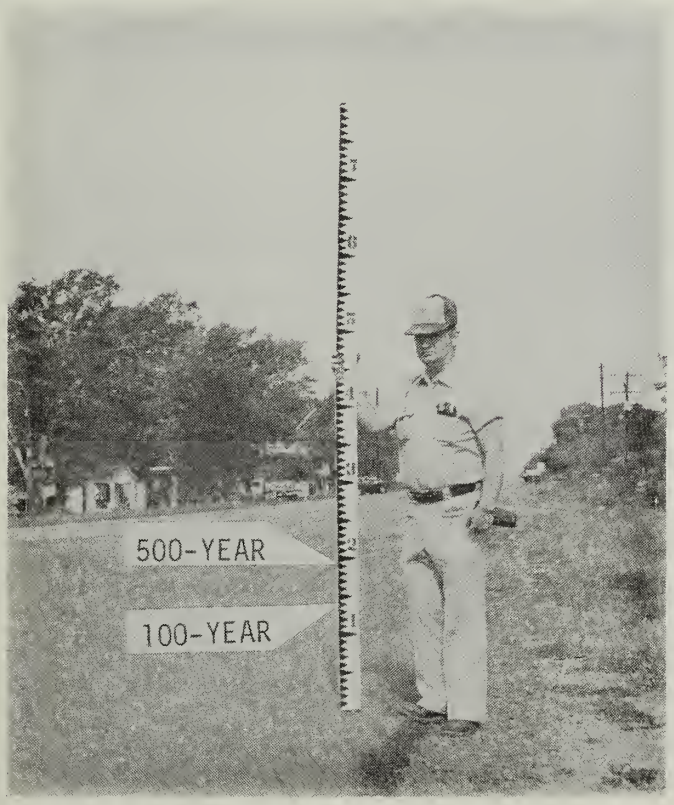


FIGURE 2 -- Potential flood heights on cross section 24 at south edge of pavement of culvert over Davidson Creek, Tributary 1 on FM 160.

FIGURE 3 -- Potential flood heights on cross section 50 on east edge of pavement of culvert over Copperas Hollow Creek on SH-36.



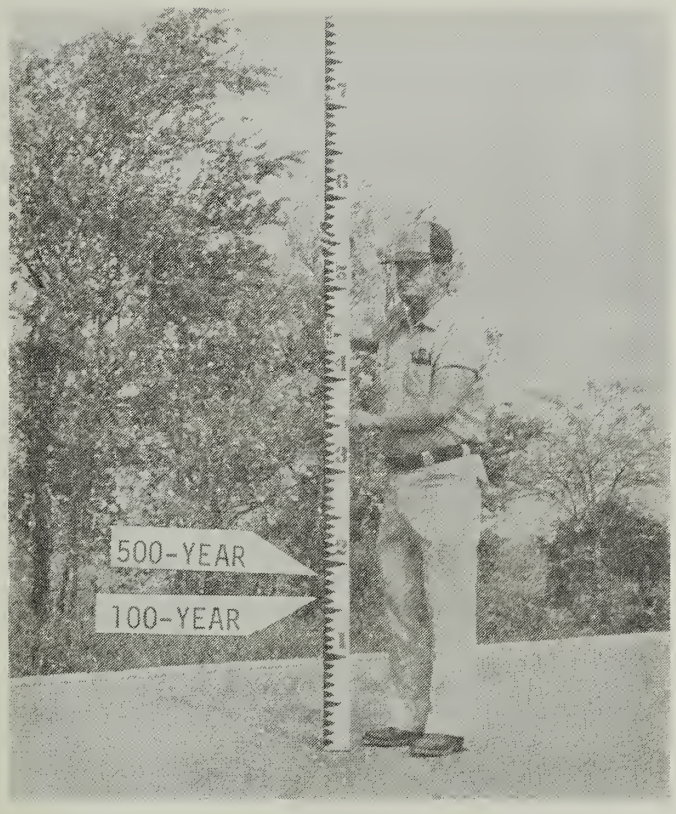
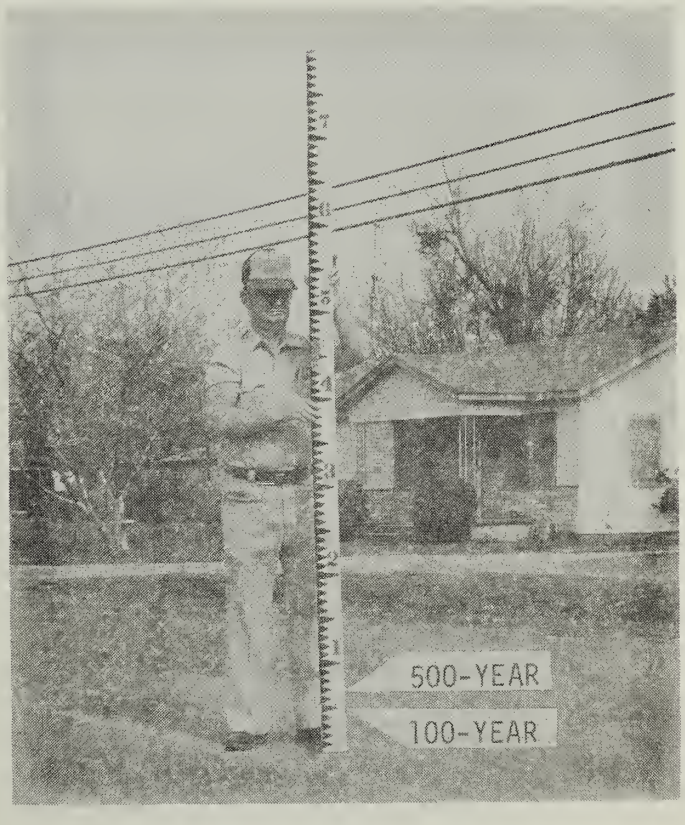


FIGURE 4 -- Potential flood heights on cross section 60 on centerline of culvert over Elm Branch on FM 975.

FIGURE 5 -- Potential flood heights on cross section 79 on centerline of Banks Street at culvert over Elm Tributary 1.



Following is a tabulation of the acreages of rural and urban areas subject to inundation by the 100-year and 500-year floods.

FLOODED AREAS
DAVIDSON CREEK AND TRIBUTARIES WATERSHED

	Rural (Acres)	Urban (Acres)	Total (Acres)
Within the 100-year frequency flood plain	586	288	874
Within the 500-year frequency flood plain	684	323	1007

Upstream flood plain and watershed land use changes anticipated by local officials within the next 10 to 15 years are not expected to significantly affect future flood elevations on the flood plains of the study area.

EXISTING FLOOD PLAIN MANAGEMENT

The 61st Texas Legislature in 1969 enacted the Texas Flood Control and Insurance Act, Article 8280-13 VACS, and Article 1581e-1 VACS. Article 8280-13 named the Texas Water Development Board and the State Board of Insurance as the responsible state-level agencies in respect to the National Flood Insurance Program. In 1985, the 69th Texas Legislature created the Texas Water Development Board and the Texas Water Commission from the Texas Department of Water Resources. Article 8280-13 was codified in Texas Water Code (Subchapter I, Section 16.311), and responsibility for the flood insurance program in Texas was assigned to

the Texas Water Commission and the State Board of Insurance. Subchapter I, Section 16.315 of the Code authorizes all political subdivisions, including cities, counties, and many types of special purpose districts and authorities, to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program.

At the present time, state-level statutory controls on use and management of flood hazard areas are fairly limited. Subchapter G, Section 16.236 of the Texas Water Code requires the Texas Water Commission or the local political entity to approve plans for any levee or other such improvement which may change floodflows of any stream in Texas that is subject to floods. Also, in December 1977, Governor Briscoe issued Executive Order No. 34-A calling for state agencies to implement a flood plain management program for state-owned property and facilities. This state program will utilize state agency rules and regulations calling for evaluation of flood hazards and will conform to the minimum flood plain management criteria established by the U. S. Department of Housing and Urban Development for the National Flood Insurance Program.

ALTERNATIVES FOR FLOOD PLAIN MANAGEMENT

PRESENT CONDITIONS

Residences, businesses and public buildings are presently located within the study area flood plain and additional development is underway. Since flood hazard area maps have not been available prior to this study, the flood plain has been developed with very little regard to possible future flood damage.

LAND TREATMENT

Effective conservation land treatment is presently being carried out by land users in the watershed. Excess runoff or erosion and sedimentation due to lack of conservation land treatment is not a major cause of flooding.

PRESERVATION AND RESTORATION OF NATURAL VALUES

Since the primary natural value of the study area flood plain is its ability to transport floodwaters, encroachment onto the flood hazard areas of the flood plain with obstacles which interfere with the movement of floodwater should be avoided to preserve its present flowage capacity.

The woody areas along the streambanks in the flood plain are considered important environmental corridors and wildlife habitat. Provisions should be made to protect these woody areas in the planning and development of new urban areas.

Nonprime farmland soils should be used for construction sites and other non-farm uses in order to preserve prime farmland. Information on prime farmland soils in the study area may be obtained from the Soil Conservation Service Office at Caldwell, Texas.

NONSTRUCTURAL MEASURES

Nonstructural measures which will help reduce or minimize flood losses include flood proofing, flood warning systems, relocation, zoning regulations, participation in the national flood insurance program, emergency preparedness, and building or development codes.

Flood proofing can reduce flood damages by a combination of structural provisions and changes or adjustments to properties subject to flooding. Examples of flood proofing are sealing low window and door openings and modifying floor drains to prevent the entrance of flood waters.

Flood warning systems should be coordinated with local disaster plans. The National Weather Service issues warnings of potential flood producing storms. Staff gages set at key locations can be monitored to give advance warnings. A float-activated electronic signal could be connected to the local police or fire station for monitoring.

Relocation involves permanent evacuation of developed areas subject to inundation, acquisition of lands by purchase, removal of improvements and relocation of the population from such areas. Such lands could be used for parks or other purposes that would not suffer large damages and would not interfere with floodflows.

Zoning is a legal method used to implement and enforce the details of the flood plain management program, to preserve property values, and to achieve the most appropriate and beneficial use of available land. Clear, concise, and thorough zoning bylaws with enforcement of the bylaws are essential to make zoning effective.

Flood insurance was established by the National Flood Insurance Act of 1968 (Public Law 90-448, as amended) to make limited amounts of flood insurance, which were previously unavailable from private insurers, available to property owners and occupiers. The Flood Disaster

Protection Act of 1973 (Public Law 93-234, as amended) was a major expansion of the National Flood Insurance Program.

Flood insurance is available through local insurance agents and brokers only after a local governing body applies and is declared eligible for the program by the Federal Insurance and Hazard Mitigation Division of the Federal Emergency Management Agency (FEMA). Adoption and enforcement of a local flood prevention ordinance which meets FEMA minimum flood plain management criteria is necessary to qualify and maintain eligibility.

In those communities participating in the FEMA program, owners and occupiers of all buildings and mobile homes in the entire community are eligible to obtain flood insurance coverage. Where flood insurance is available, it is recommended that buildings and mobile homes within or adjacent to the delineated flood hazard areas carry flood insurance on the structure and contents.

Emergency preparedness consists of a plan by local officials to be put into effect in the event of flooding. Procedures are worked out and personnel designated to implement the plan. Methods and procedures to alert and warn the populace of possible flooding are developed. High risk areas, handicapped, elderly or others known to need help during evacuation are located and identified. Plans are made for their evacuation or rescue. Shelters are provided for evacuees.

Building codes are developed to set up minimum standards for controlling the design, construction, and quality of materials used in buildings and structures within a given area to provide safety for life, health, property and public welfare. Building codes can be used to minimize structural and subsequent damages resulting from inundation. Building restriction codes can:

1. Specify adequate anchorage to prevent flotation of buildings from their foundations.

2. Establish basement elevations and minimum first-floor elevations in accordance with potential flood heights.

3. Prevent virtually all damage by elevating the foundation and prohibiting basements in those areas subject to very shallow and frequent flooding.

4. Require building reinforcement to withstand water pressure or high velocity flow and restrict the use of materials which deteriorate rapidly in the presence of water.

5. Prohibit equipment that might be hazarous to life when submerged. This includes chemical storage, boilers, and electrical equipment.

Development policies which are designed to prevent construction of streets and utility systems in flood prone areas tend to slow development of the flood plains.

STRUCTURAL MEASURES

Structural measures such as dams or channels were considered as a means of reducing flood losses.

Suitable sites for floodwater retarding structures appear to be available on Davidson Creek. The upper one-fourth of the watershed lies in deep sands of the Forested Coastal Plains, and foundation and suitable fill material problems might be encountered.

The channel capacities in the middle and lower reaches of all streams are very small. The gradient of Davidson Creek from the vicinity of Caldwell to its mouth is very low. The flood plain is so wide and flat and the channel so small that channel improvement or floodways would have to be investigated.

Over 75 percent of the major flood prevention benefits would be derived by land use intensification, and these land use changes would probably not occur without a large degree of flood protection.

An investigation of a complete watershed protection program would not appear feasible at this time, because of the low damageable values, small channel capacities and the high degree of control necessary before it would be reasonable to expect much land use intensification.

SELECTED ALTERNATIVE

The alternative for reducing flood losses selected by the city of Caldwell for immediate implementation is to contact the Federal

Insurance and Hazard Mitigation Division of the Federal Emergency Management Agency (FEMA) and apply for inclusion in the Regular National Flood Insurance Program. The City will adopt and implement the flood plain management ordinances necessary to qualify for and maintain eligibility in the Regular National Flood Insurance Program.

The City will also initiate steps to improve surface drainage by providing outlets for trapped local surface runoff water.

Other alternatives listed in this report will be considered for later implementation.

FLOOD HAZARD MAPS

The index map (Appendix, page 7) shows the stream reach covered by each of the photomaps. The index map also shows the watershed boundaries and stream reaches studied.

The limits of the 100-year and 500-year frequency floods, for present conditions, were delineated on aerial photographs (Appendix, pages 9 to 43) to indicate the extent of area inundated. The 10-year and 50-year frequency floods for present conditions could not be effectively shown on the aerial photographs due to the map scale and topography. The flood lines shown are based on field surveys of roads, bridges, and valley sections used in conjunction with Geological Survey topographic maps having 10-foot contour intervals, and interpretation of aerial photographs. These maps should only be used to determine the approximate boundaries of the flooded areas. Actual dimensions measured

on the ground may vary slightly from those measured on the photomaps of this report due to map scale and reproduction limitations. The water surface profile elevations should be used to determine actual on the ground dimensions.

Flood elevations in this report are minimum elevations. Debris may collect at bridges and culverts and clog the channels during major floods and increase the depth of flooding. Analyses were made without showing the effects of potential obstructions. Also extremely rare events such as catastrophic storms were not analyzed.

TECHNICAL APPENDIX

A technical appendix is included in this report. The index map, flood hazard area photomaps and flood profiles are included in the Appendix. The index map shows the study area coverage of individual flood hazard area maps and the watershed boundaries (Appendix, page 7).

The water surface profiles of Davidson Creek and Tributaries show the profiles of the 10-year, 50-year, 100-year, and 500-year frequency floods for present conditions. Included on the profiles are stream elevations of the channel bottom, pertinent bridge and roadway data, and other location data. The stationing of profile is bank full stream channel distance in feet and is based on measured distances from the 1981 flight of aerial photomaps. Flood depths can be estimated at any location on the stream reach from the water surface profiles. The water surface profiles are included in the Appendix, pages 45 to 75. They

consist of Davidson Creek, pages 45 to 51; Davidson Creek Tributary 1, pages 53 to 57; Davidson Creek Tributary 2, page 59, Copperas Hollow Creek, pages 61 to 65; Elm Branch, pages 67 to 71; and Elm Branch Tributary 1, pages 73 to 75. An index is included in the Appendix pages 5 and 6, to assist the user in relating the flood hazard area photomaps to the appropriate water surface profile.

Cross sections, representative of the streams studied, have been plotted to illustrate the shape of that stream and its flood plain. The 10-year, 50-year, 100-year, and 500-year floodwater surface elevations are shown on the plotted cross section to illustrate the effect of various flood depths (see Appendix, pages 77 to 81).

The elevations, discharges and flood plain width of the 10-year, 50-year, 100-year and 500-year floods at surveyed cross sections are shown in Appendix Table 2. Each cross section is listed by number on this table. Each cross section is also identified by number on flood hazard area photomaps. The user can locate a cross section on the photomap, turn to Table 2, (Appendix, pages 83 to 87) and read the discharge, elevation, and flood plain width directly from the table.

Also, included in the Appendix is a list of elevation reference marks showing the elevation and location of each. Additional data are on file in the USDA Soil Conservation Service State Office, W.R. Poage Federal Building, 101 South Main Street, Temple, Texas 76501-7682.

GLOSSARY

Channel -- A natural stream that conveys water; a ditch or channel excavated for the flow of water.

Channel Bottom -- The elevation of the deepest part of a stream channel at a particular cross section.

Channel Modification -- The modification of the flow characteristics of a channel by clearing, excavation, realignment, lining, or other means to increase its capacity; sometimes used to connote channel stabilization.

Flood -- An overflow or inundation that comes from a river or other body of water and causes or threatens damage.

Flood Frequency -- A means of expressing the probability of flood occurrences as determined from a statistical analysis of representative stream flow or rainfall and runoff records. A 10-year frequency flood would have an average frequency of occurrence in the order of once in 10 years (a ten percent chance of being equaled or exceeded in any given year). A 50-year frequency flood would have an average frequency of occurrence in the order of once in 50 years (a two percent chance of being equaled or exceeded in any given year). A 100-year frequency flood would have an average frequency of occurrence in the order of once in 100 years (a one percent chance of being equaled or exceeded in any given year). A 500-year frequency flood would have an average frequency

of occurrence in the order of once in 500 years (a 0.2 percent chance of being equaled or exceeded in any given year).

Flood Peak -- The highest value of the stage or discharge attained by a flood, thus, peak stage or peak discharge.

Flood Plain -- 1. Nearly level land situated on either or both sides of a channel which is subject to overflow flooding. 2. Lowland and relatively flat alluvial areas adjoining inland and coastal waters (streams, bays, etc.), including flood-prone areas of off shore islands.

500-Year Flood Plain -- The land that would be flooded on an average of once every 500 years.

100-year Flood Plain -- The land that would be flooded on an average of once every 100 years.

Flood Profile -- A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage -- The stage at which overflow of the natural banks of a stream begins to cause damage in the reach in which the elevation is measured.

High Water Mark (HWM) -- The maximum observed and recorded height or elevation that floodwater reaches during a storm, usually associated with the flood peak. The high water mark may be referenced to a particular building, bridge or other landmark, or based on debris deposits on bridges, fences, or other evidence of the flood.

Low Bank -- The highest elevation of a specific channel cross section at which the water will be contained without overflowing onto adjacent flood plain areas.

Runoff -- That portion of the precipitation on a drainage area that is discharged from the area in stream channels; types include surface runoff, groundwater runoff, or seepage.

Structural Bottom of Opening -- The lowest point of a culvert or bridge opening with a constructed bottom through which a stream flows that could tend to limit the stream channel bottom to that specific elevation. This structural bottom may be covered with sediment or debris which further restricts the size of the opening.

Top of Opening -- The lowest point of a bridge, culvert, or other structure over a river, stream or watercourse that limits the height of the opening through which water flows. This is referred to as "low steel" or "low chord" in some regions.

Water Surface Profile -- A graph showing the relationship of water surface elevation to stream channel location for a specific flood event.

Watershed -- All land and water within the confines of a drainage divide.

Watershed Boundary -- The divide separating one drainage basin from another.

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APPENDIX

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TECHNICAL APPENDIX

This Technical Appendix to the Davidson Creek and Tributaries Flood Plain Management Study Report is a compilation of the FPMS technical findings. It includes the photomap index, flood hazard area photomaps, flood profiles, plottings of typical stream cross sections, elevation and discharge tabulations and a listing of pertinent elevation reference marks. Other technical data developed during this study are on file in the USDA Soil Conservation Service State Office, W.R. Poage Federal Building, 101 South Main Street, Temple, Texas 76501-7682.

INVESTIGATIONS AND ANALYSES

FIELD SURVEYS

Topographic data were obtained from Geological Survey topographic maps and field surveys. Engineering surveys were made of cross sections selected to represent the stream hydraulics and flood plain areas (refer to the sheets of typical valley cross section, Appendix, pages 77 to 81). Elevations appearing in this report are based on mean National Geodetic Vertical Datum of 1929. Temporary elevation reference marks were established by O'Malley and Clay, Inc. in 1985. Table 3 Appendix, pages 88 to 93, shows the listings, descriptions, and location of permanent and temporary elevation reference marks.

HYDROLOGIC AND HYDRAULIC METHODS

The Davidson Creek and Tributaries watershed boundaries were determined by use of Geological Survey topographic maps. The top of the watershed begins approximately 14.2 miles northwest of the Caldwell city limits. Hydraulic evaluations were based on synthetic frequency methods. Rainfall frequency data were obtained from Weather Bureau Technical Paper No. 40, Rainfall Frequency Atlas of the United States. Values greater than the 100-year frequency event were determined by extrapolation of the rainfall versus frequency graph. Peak discharge values were obtained using Geological Survey Water Resources Investigations 77-110 Open-File Report, "Technique for Estimating the Magnitude and Frequency of Floods in Texas."

From the representative stream and road cross sections, water surface profiles were developed by the Modified Slope Area Method. The effects of bridges and culverts on the stream hydraulics were determined by use of the Bureau of Public Roads (BPR) Method. Computations were made using SCS's "WSP2, A Computer Program for Determining Flood Elevations and Flood Areas for Certain Flow Rates". Using the output data from this program, rating curves were developed for each cross section. These curves show the relationship between stage or elevation and discharge. Water surface profiles were developed from these rating curves and the discharges obtained using Geological Survey Water Resources Investigations 77-110 Open-File Report, "Technique for Estimating the Magnitude and Frequency of Floods in Texas."

FLOOD HAZARD EVALUATION

The 500-year and 100-year frequency flood hazard areas are outlined on aerial photographs obtained from the November 1981 Agricultural Conservation and Stabilization Service flight. The flood hazard area boundaries were developed by plotting the computed water surface elevations on the surveyed cross sections and transposing this information to the aerial photographs. The flood hazard areas between the surveyed cross sections were developed through interpretation of Geological Survey topographic maps and the aerial photographs in conjunction with the surveyed cross sections. Actual flood limits may vary slightly on the ground from the outlined area on the photomaps due to map scale and reproduction limitations. For this reason, the water surface elevations from the flood profiles should be used for determining site specific potential flood depths.

ESTIMATES OF FLOOD LOSSES

The number and type of buildings located within the delineated flood hazard areas were determined by Soil Conservation Service personnel through on-the-ground reconnaissance and interviews with local people. Potential flood depths and resulting flood damages were then estimated.

INVENTORY OF NATURAL VALUES

The natural values of the study area flood plain were determined by the Soil Conservation Service, Basin and Area Planning staff biologist through on-the-ground reconnaissance, interviews of local people and literature search.

PUBLIC PARTICIPATION

The Davidson Creek and Tributaries Flood Plain Management Study Plan of Work was developed through consultation with the local officials and study endorsers.

A public meeting was held during preparation of the report draft in order to get public input and participation.

MANAGEMENT ALTERNATIVES

Nonstructural management alternatives were considered during the flood plain management study and discussed during meetings with local public officials and other interested members of the public. Those considered to have merit and worthy of further study for possible implementation were put in the report.

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FLOOD PLAIN MANAGEMENT STUDY

FLOOD HAZARD AREA PHOTOMAPS
AND
WATER SURFACE PROFILES

Cross Section Number	Flood Hazard Area Photomap Sheet Number	Water Surface Profile Sheet Number
DAVIDSON CREEK MAIN STEM		
1	3, 4, 6	1
2	3, 7	1
3	7	2
4	7	2
5	7	2
6	7	2
7	7	2
8	7	2
9	7, 8	2
10	7, 8	2
11	8	3
12	8	3
13	8	3
14	8	3
15	8, 9, 11	3
16	8,9,10,11	3, 4
17	10	4
DAVIDSON CREEK TRIB. 1		
18	3, 4	5
19	3	5
20	3	5
21	3	5
22	3	5, 6
23	2, 3	6
24	2, 3	6
25	2, 3	6
26	2	6
27	1, 2	7
28	1, 2	7
29	1, 2	7
30	1, 2	7
31	1	7
32	1	7
DAVIDSON CREEK TRIB. 2		
33	8, 11	8
34	8, 11	8
35	8, 11	8
36	7, 8, 11	8
37	7, 8, 11, 12	8
38	7, 8, 11, 12	8
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44	7, 11, 12	8
45	7, 11, 12	8
46	7, 12	8
47	7, 12	8
48	7, 12	8
COPPERAS HOLLOW CREEK		
49	11	9
50	11	9
51	11	9
52	11	10
53	11	10
54	11, 12, 18	10
55	17, 18	10
56	18	11
57	17, 18	11
ELM BRANCH		
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59	14	12
60	14	12
61	14	12

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Cross Section Number	Flood Hazard Area Photomap Sheet Number	Water Surface Profile Sheet Number	Cross Section Number	Flood Hazard Area Photomap Sheet Number	Water Surface Profile Sheet Number
ELM BRANCH (Cont'd)					
62	14	12			
63	14	12			
64	14	12			
65	14	12			
66	13, 14	13, 14			
67	13, 16	14			
ELM BRANCH TRIB. 1					
68	5,6,13,14	15			
69	5,6,13,14	15			
70	13, 14	15			
71	13, 14	15			
72	13, 14	15			
73	13, 14	16			
74	13	16			
75	13	16			
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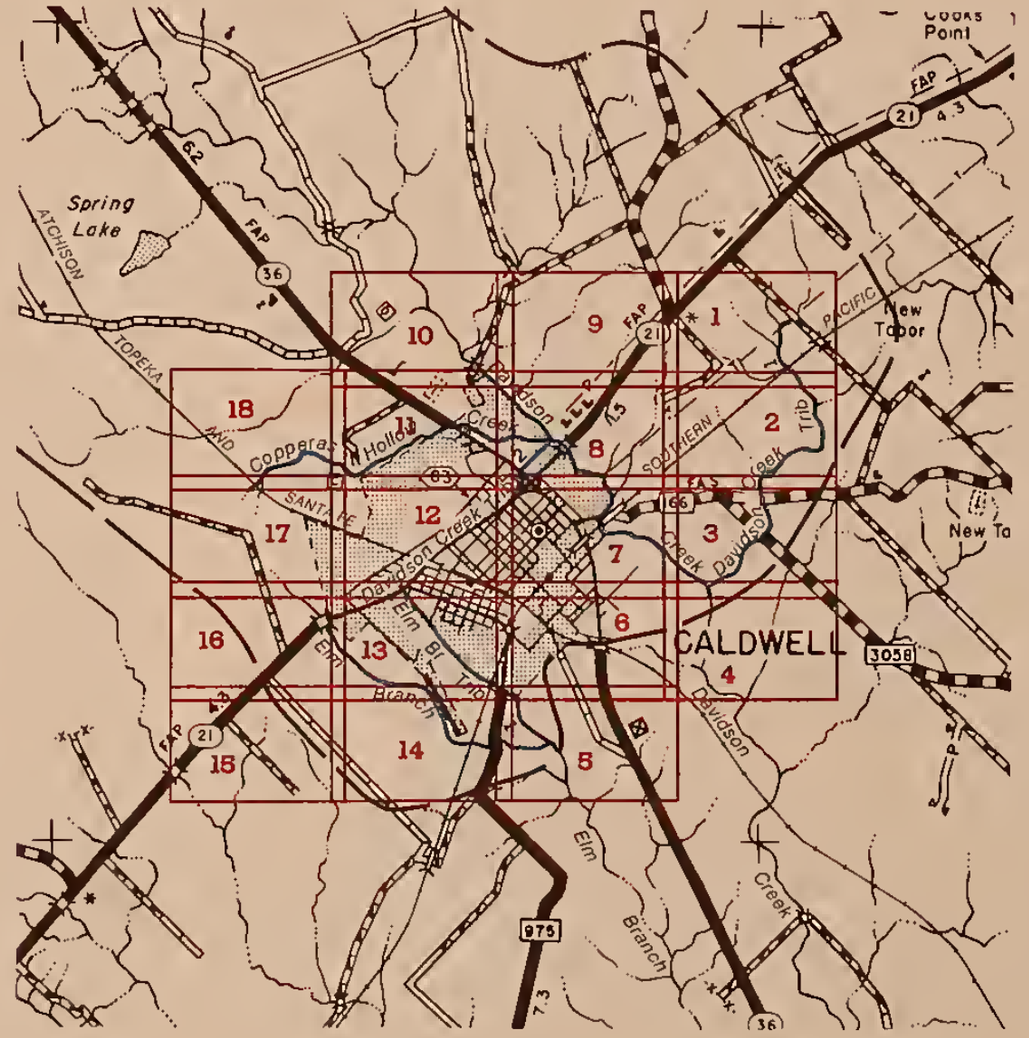
81	12, 13	16			



VICINITY MAP

LEGEND

- CITY LIMIT
- RAILROAD
- STATE HIGHWAY
- FARM TO MARKET ROAD
- WATERSHED BOUNDARY
- STREAM CHANNEL STUDY REACH
- 9 PHOTOMAP COVERAGE

INDEX MAP

DAVIDSON CREEK AND TRIBUTARIES

FLOOD PLAIN MANAGEMENT STUDY

BURLESON COUNTY, TEXAS

0 1 2 3
MILES

0 1 2 3 4
KILOMETERS

SOURCE: COUNTY HIGHWAY MAP
POLYCONIC PROJECTION NORTH AMERICAN DATUM
Control: U.S. Coast and Geodetic Survey and U.S. Geological Survey
Compiled from USGS quadrangles and updated with Aerial Photographs
Compiled: 1971 Field Checked: 1971 Photographs: 1967

JULY 1986 4-R-39910

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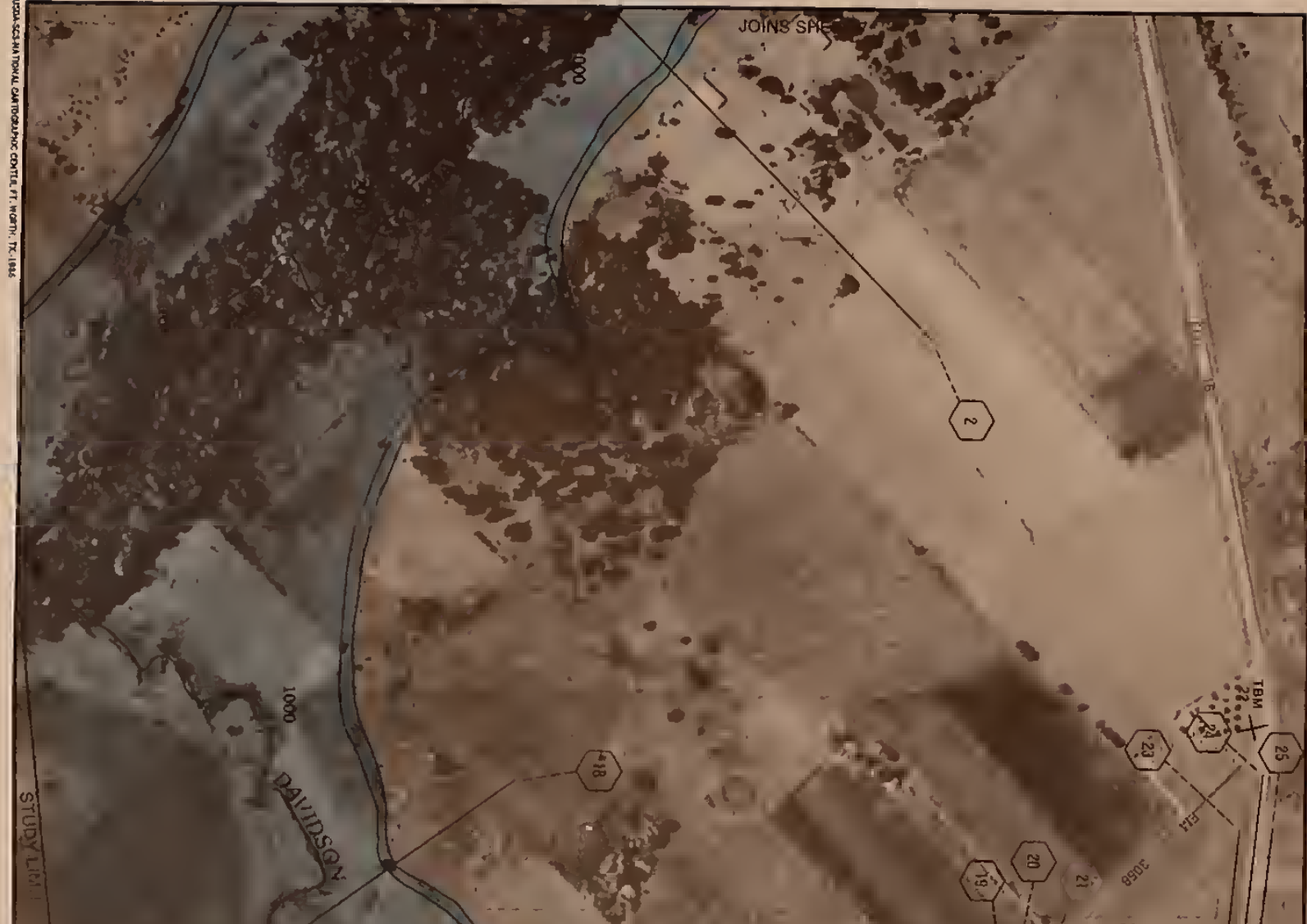

LEGEND

- 100 Year Flood Hazard Area
- 500 Year Flood Hazard Area
- Cross Section Location
- Stream Channel
- × Elevation Reference Marks
- 1000 → Channel Station

Limits of flooding may vary from actual location on the ground.

SCALE 0 400 800 FEET
0 100 200 METERS
APPROXIMATE

ASCS Photography 11-1-81

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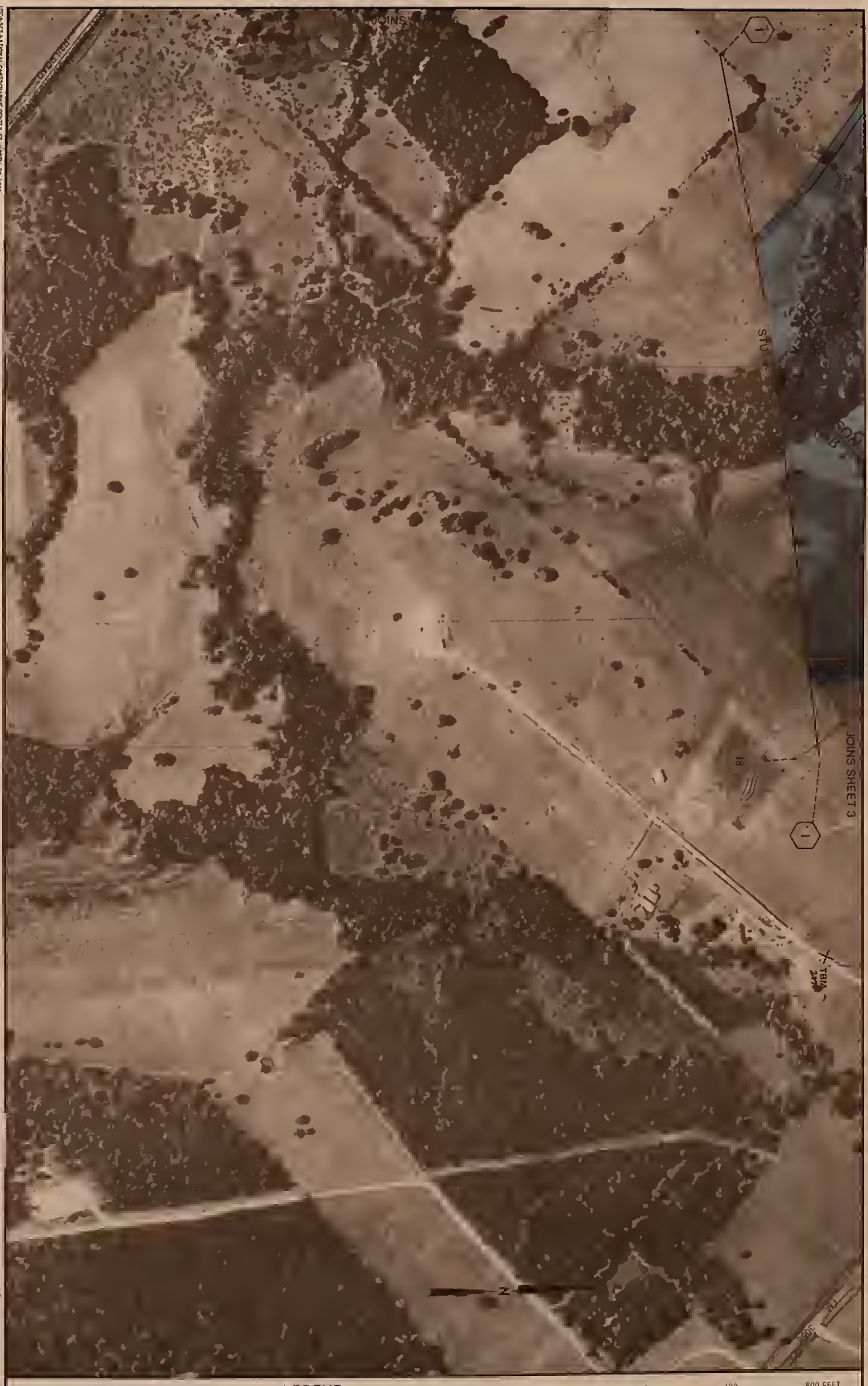

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0 100 200 METERS

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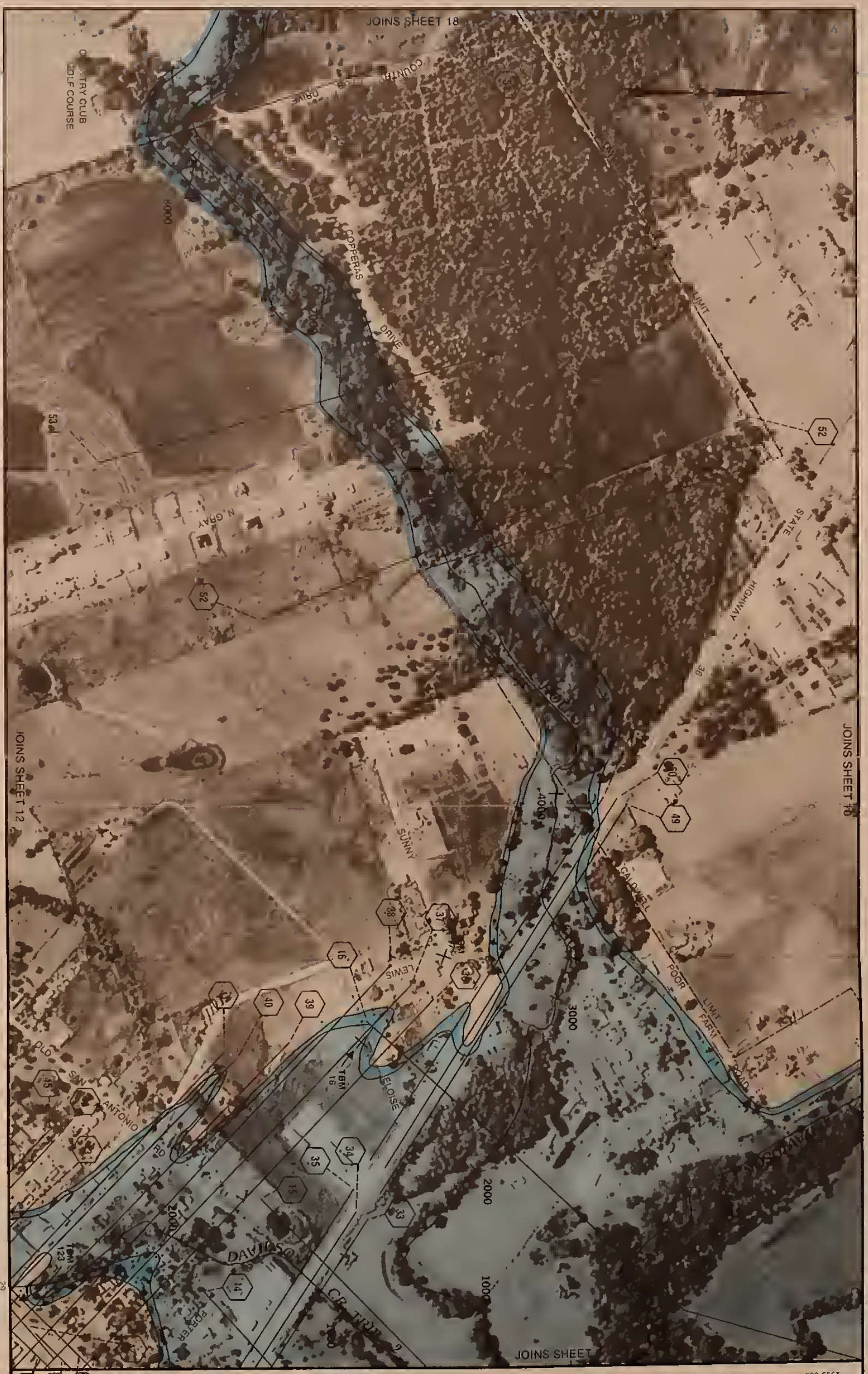

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500 Year Flood Hazard Area
Cross Section Location
Stream Channel
Elevation Reference Marks
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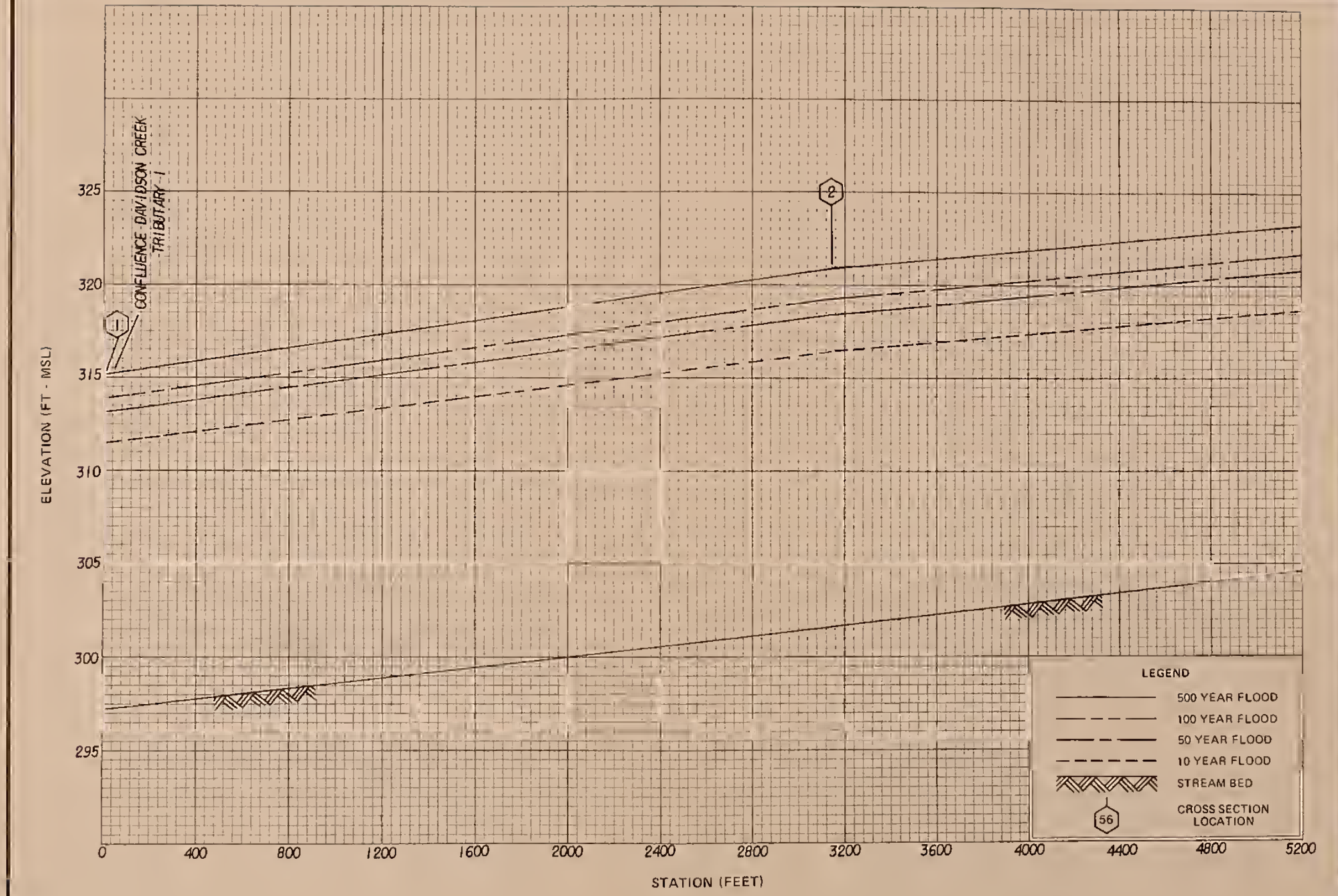

WATER SURFACE PROFILES

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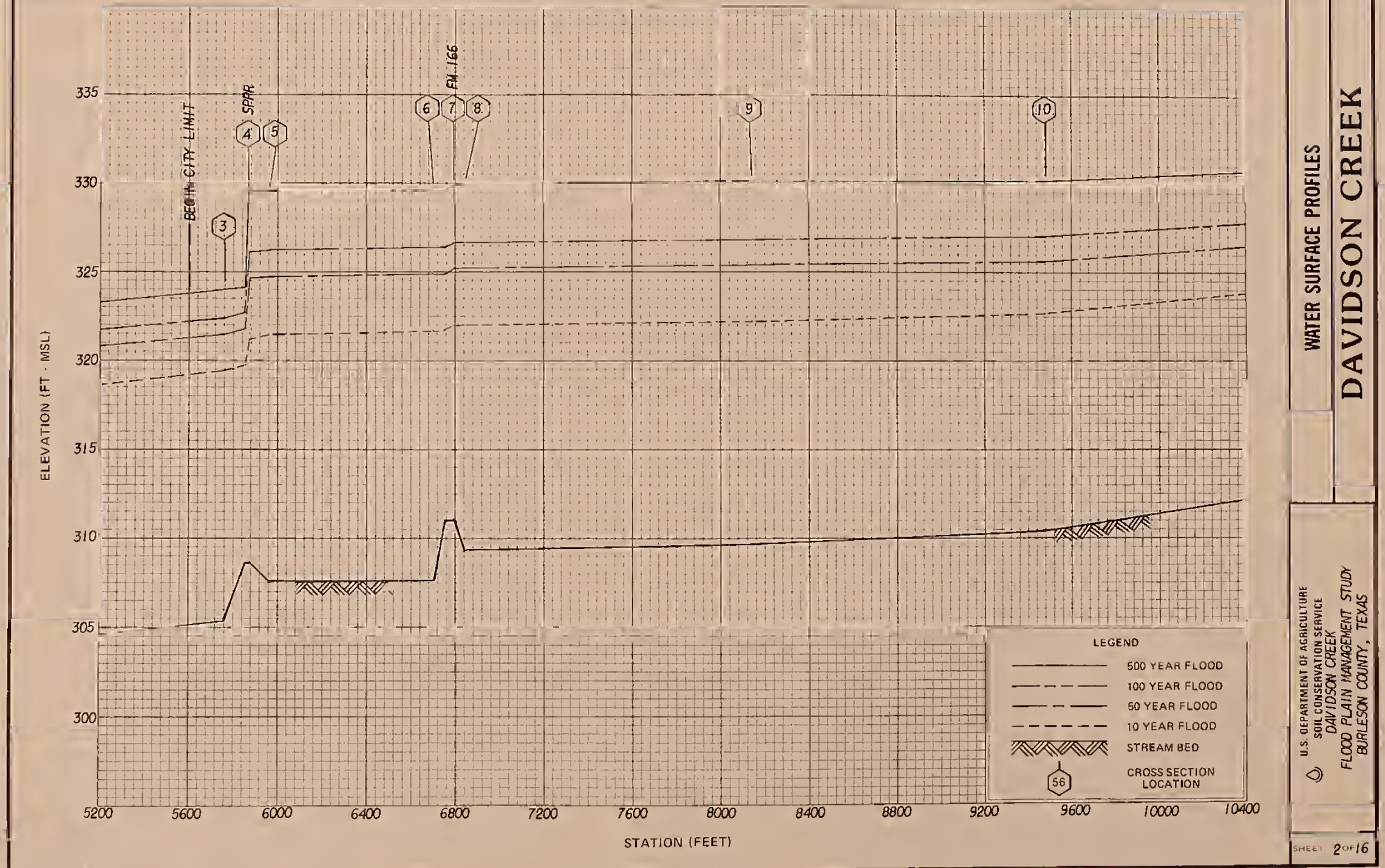

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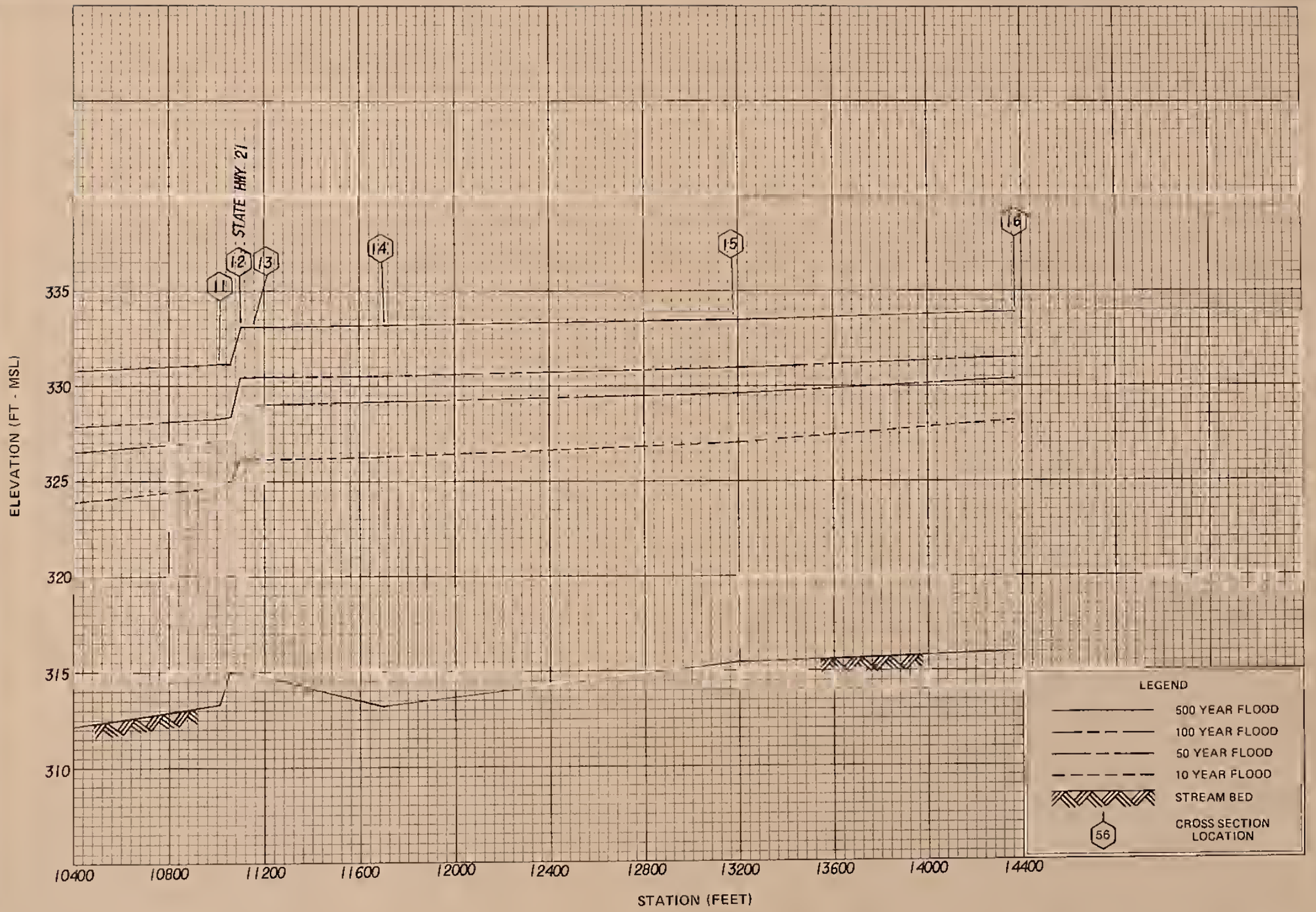

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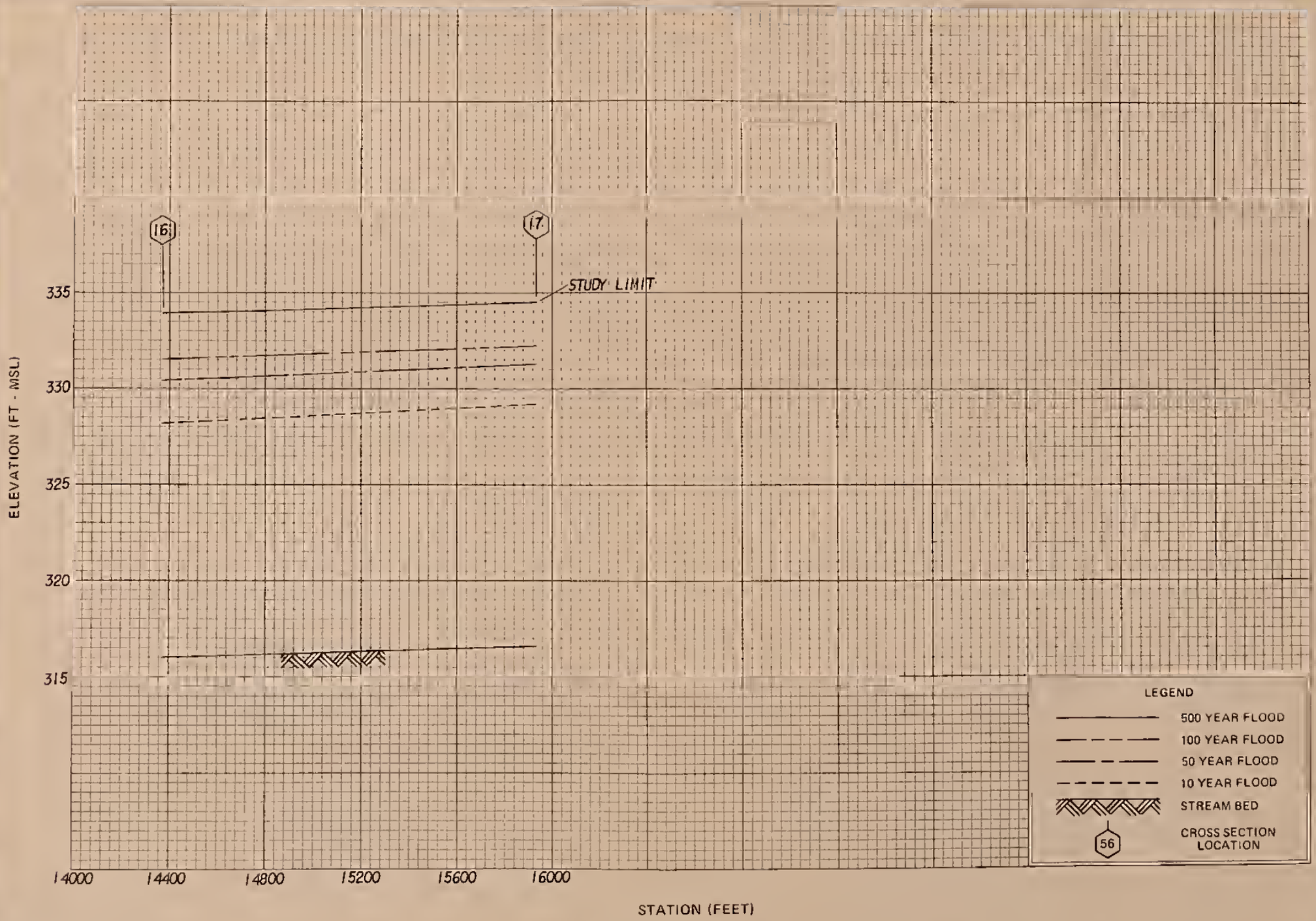

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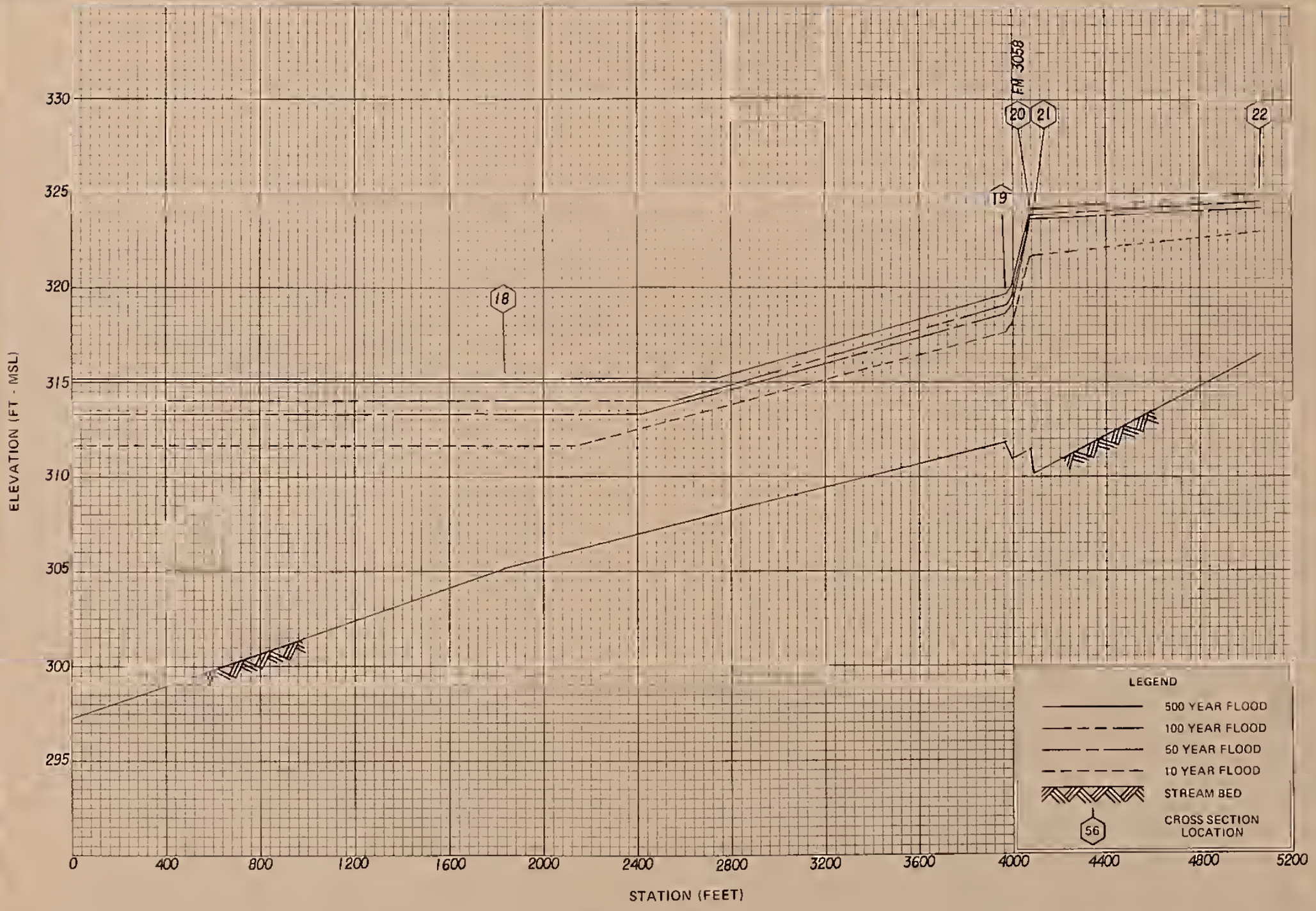

DAVIDSON CREEK TRIB 1

WATER SURFACE PROFILES

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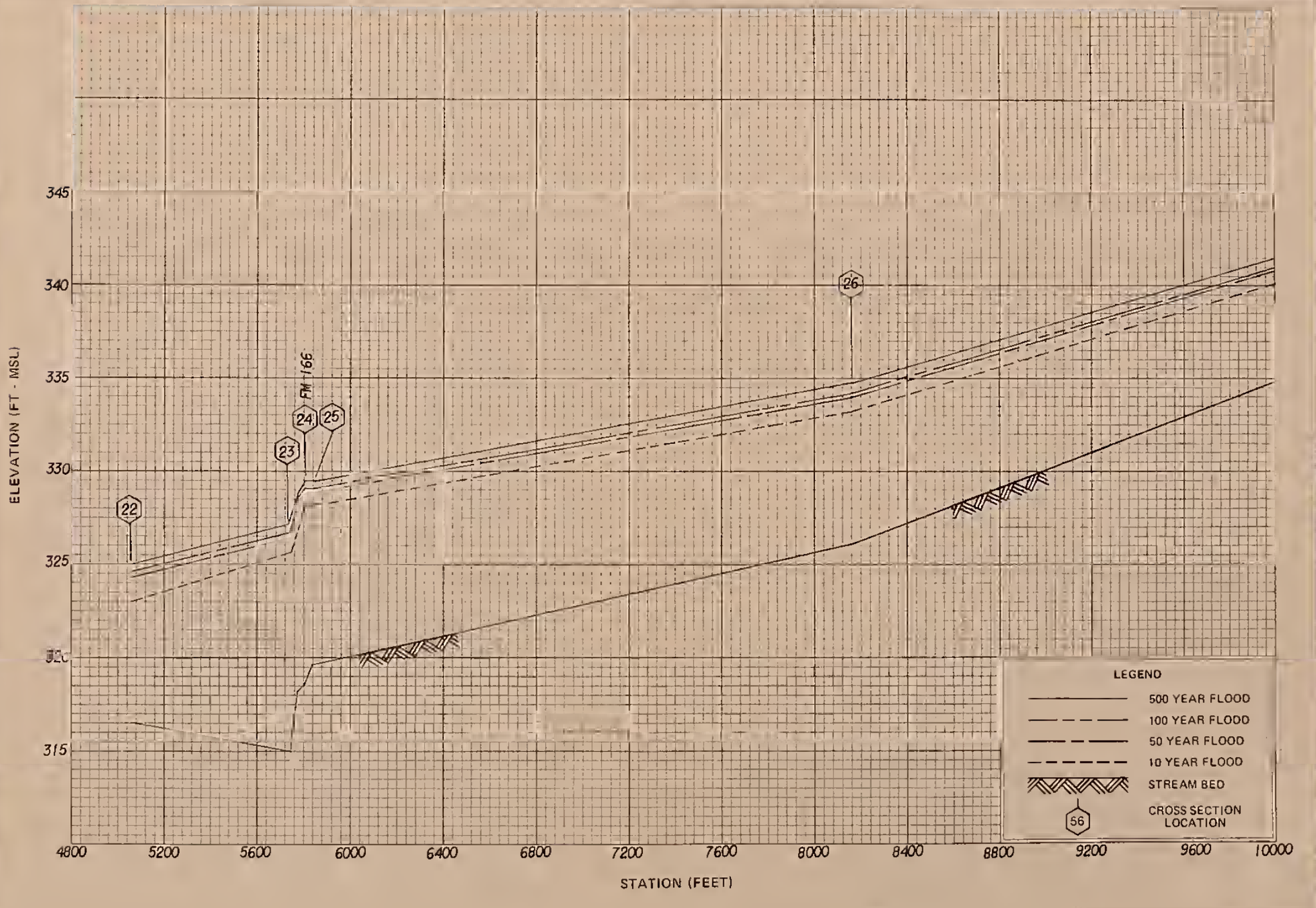

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DAVIDSON CREEK TRIB 1

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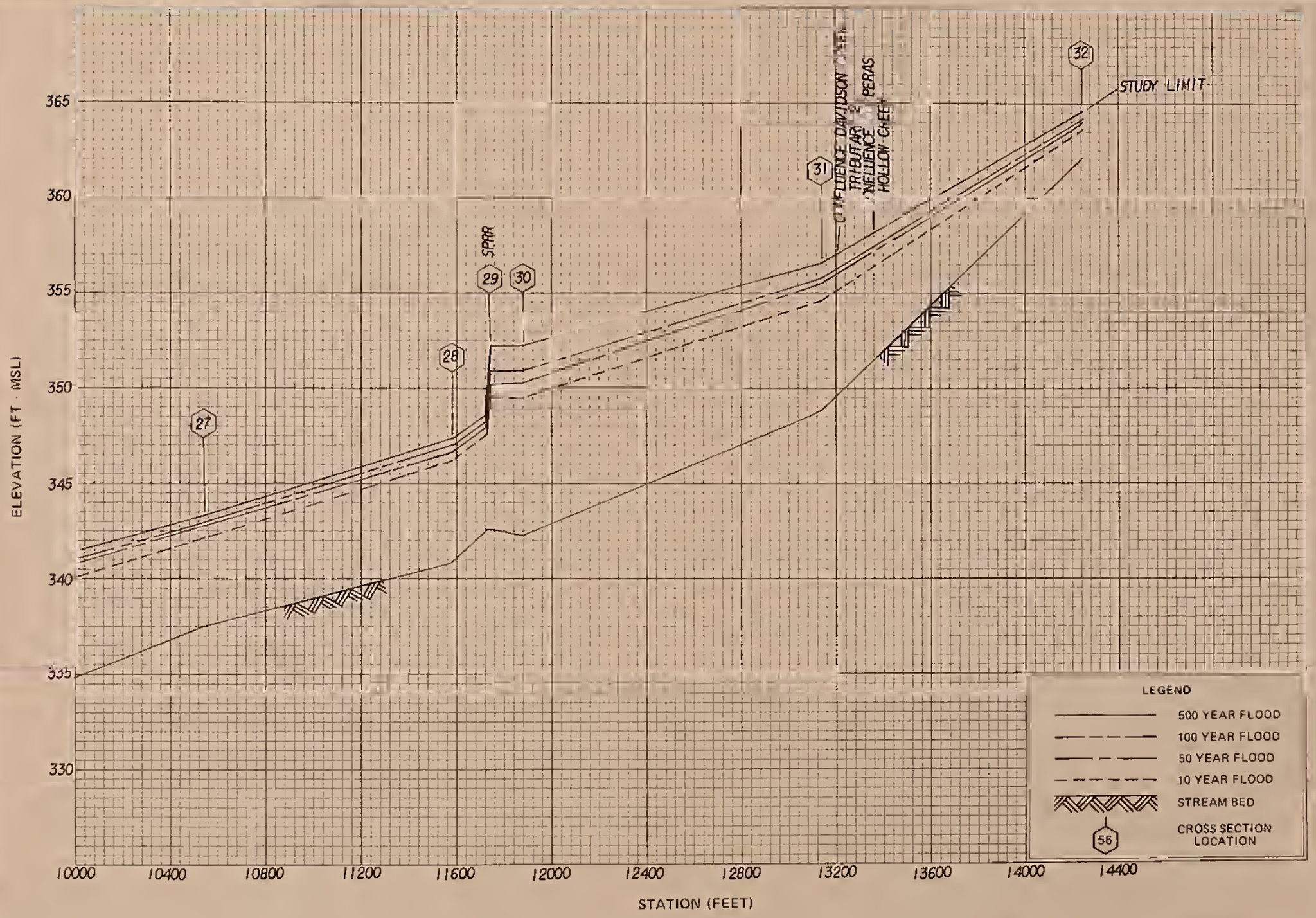

WATER SURFACE PROFILES

DAVIDSON CREEK TRIB 1

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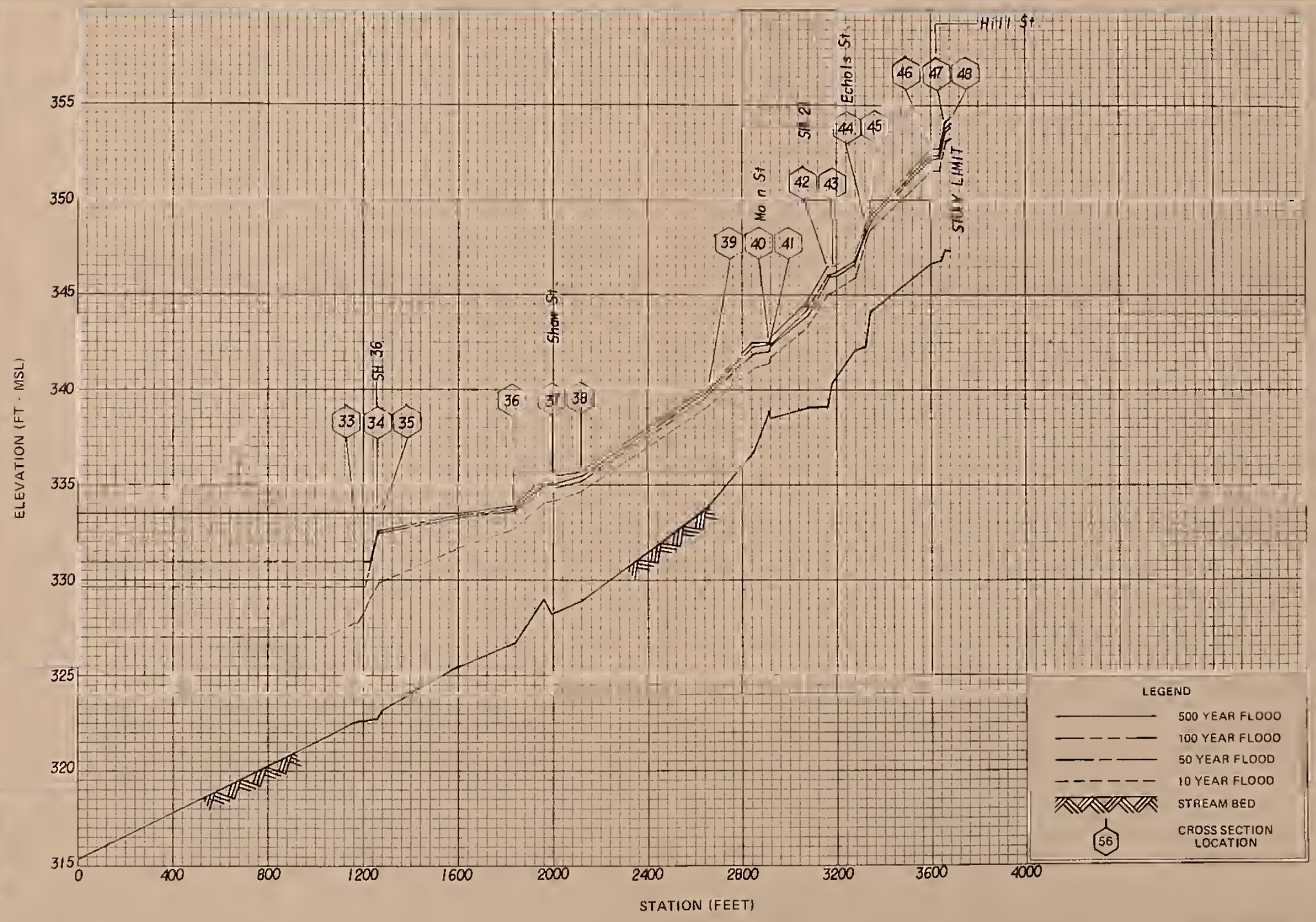

DAVIDSON CREEK TRIB 2

WATER SURFACE PROFILES

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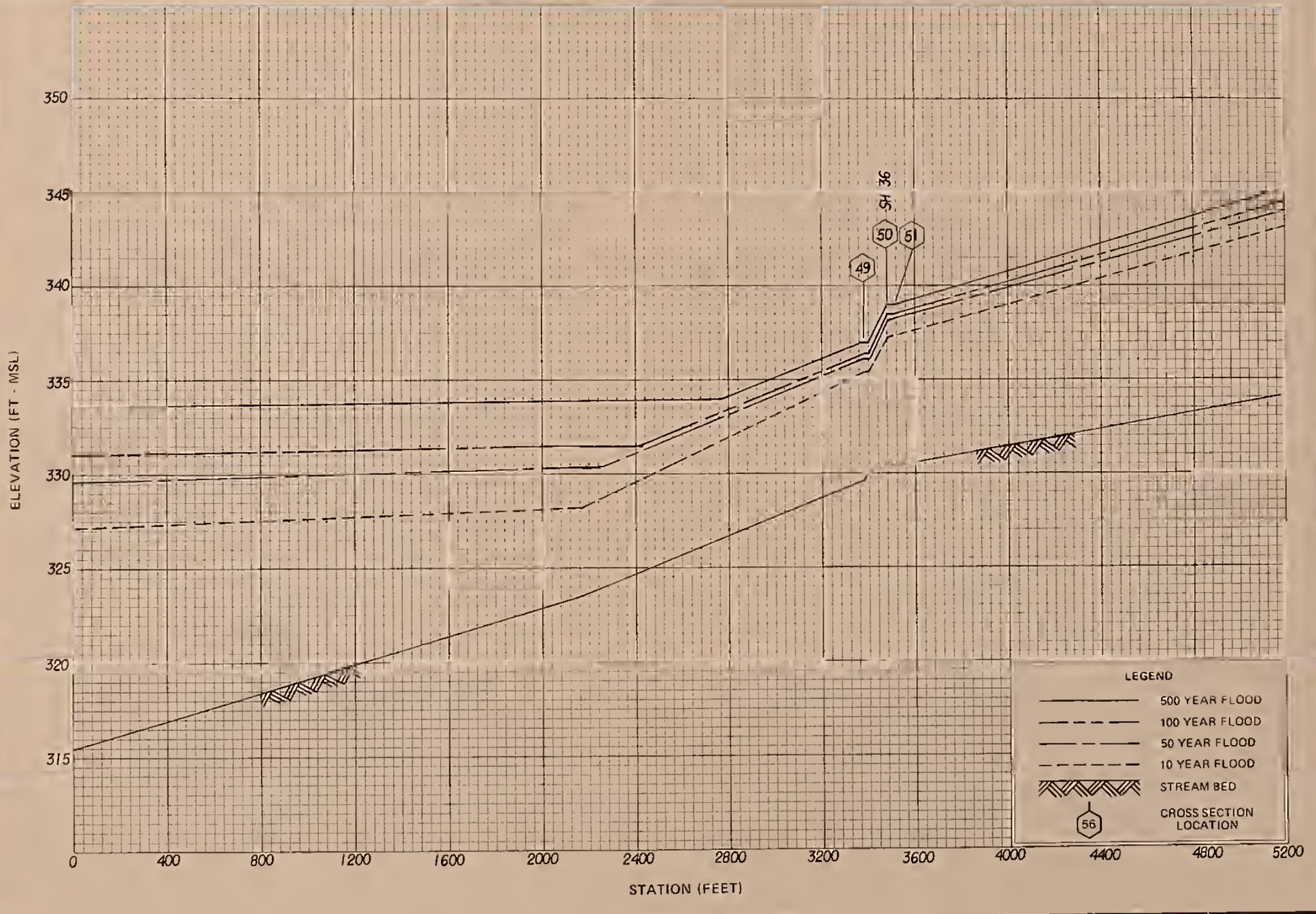

WATER SURFACE PROFILES

COPPERAS HOLLOW CREEK

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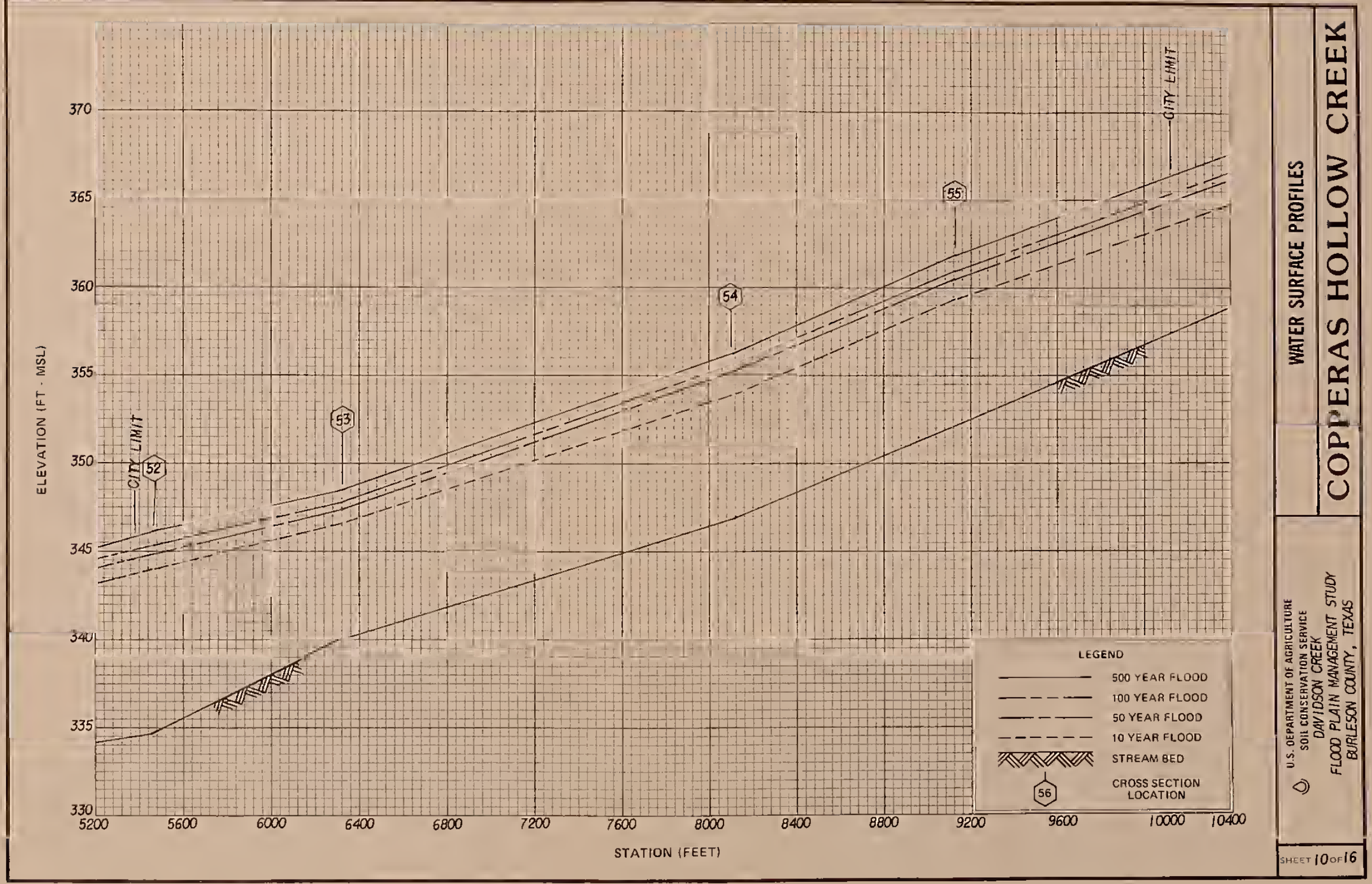
BURLESON COUNTY, TEXAS

SHEET 9 OF 16

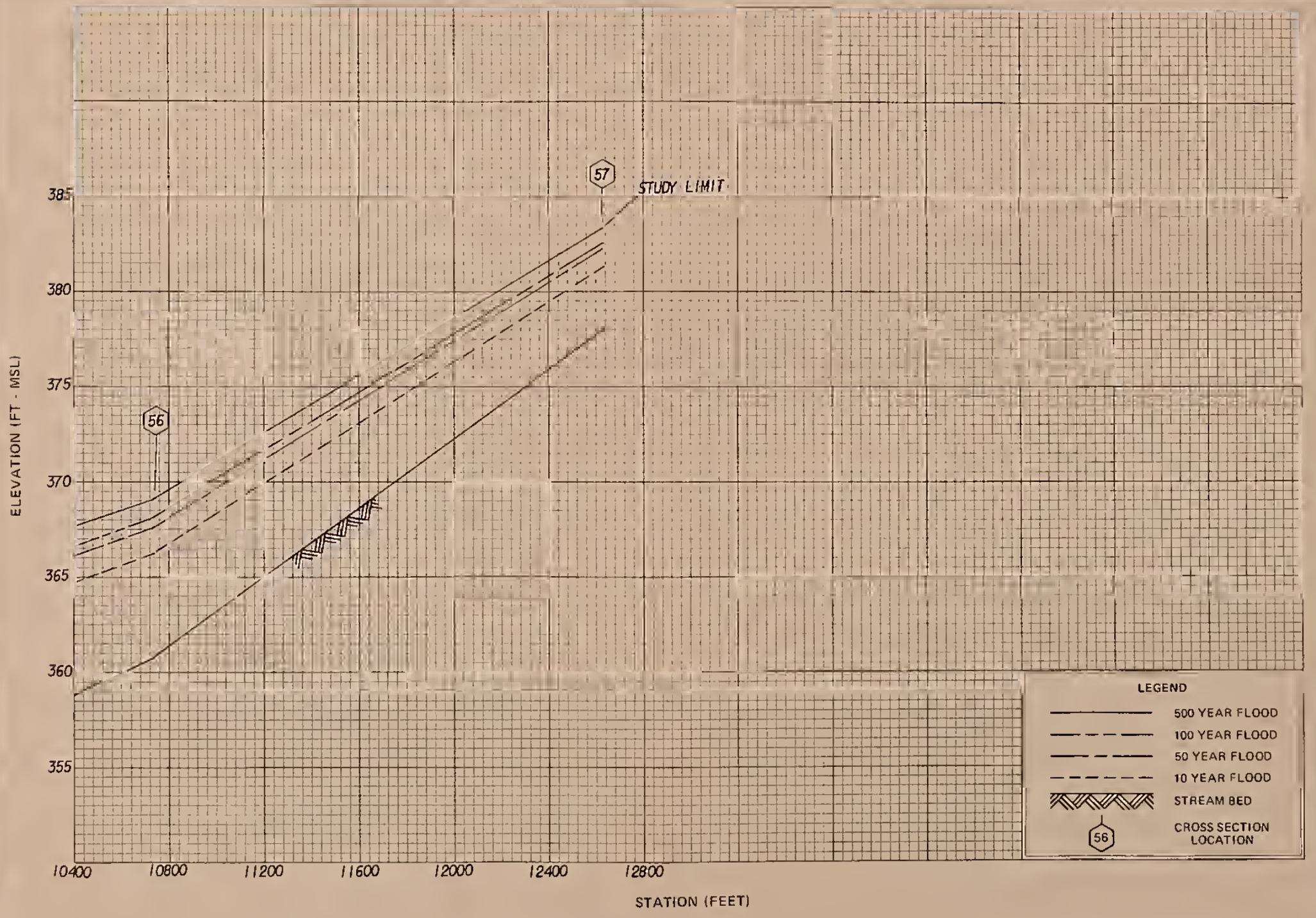


WATER SURFACE PROFILES

COPPERAS HOLLOW CREEK

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 10 OF 16

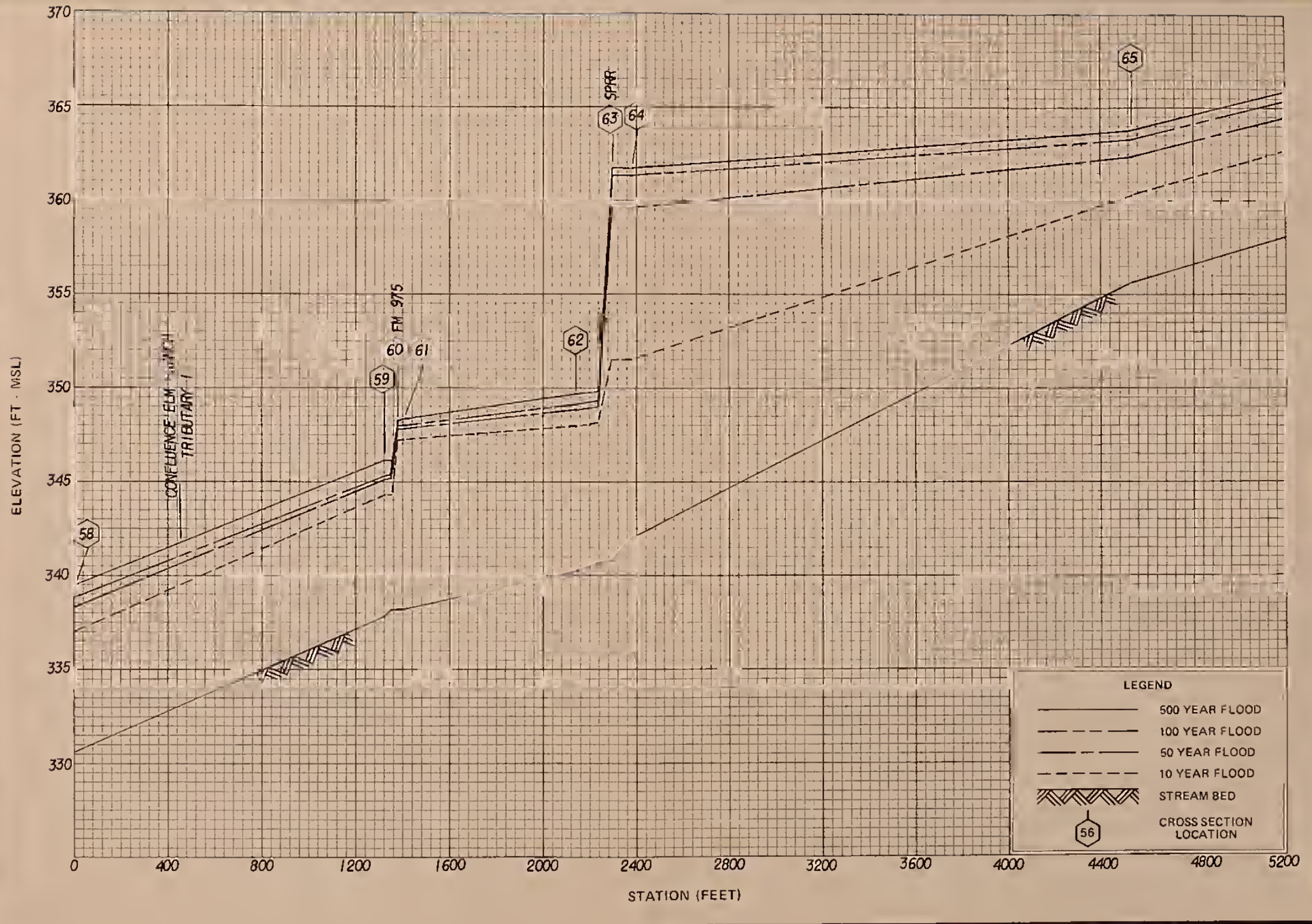


COPPERAS HOLLOW CREEK

WATER SURFACE PROFILES

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 11 OF 16

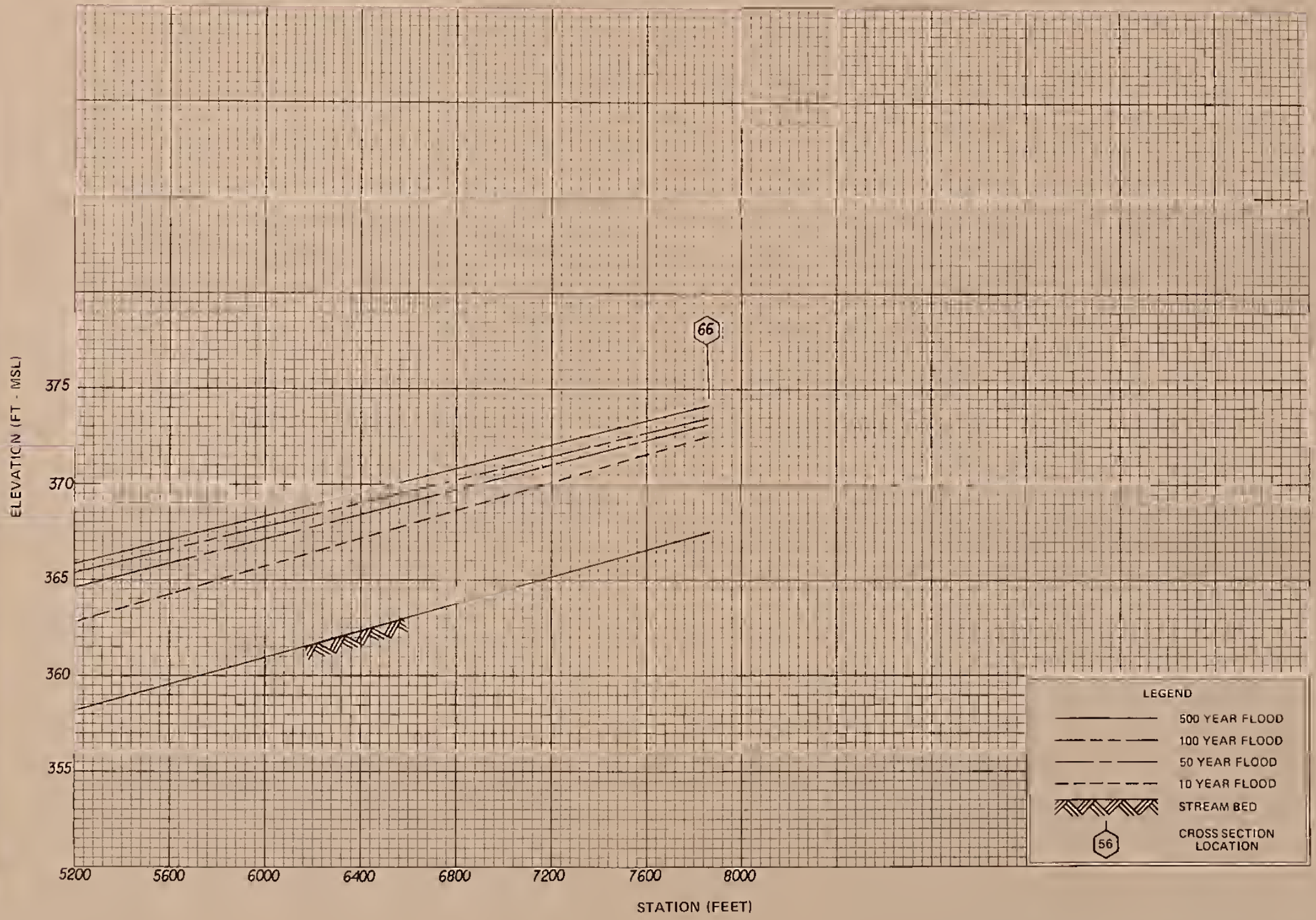


WATER SURFACE PROFILES

ELM BRANCH

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 12 OF 16

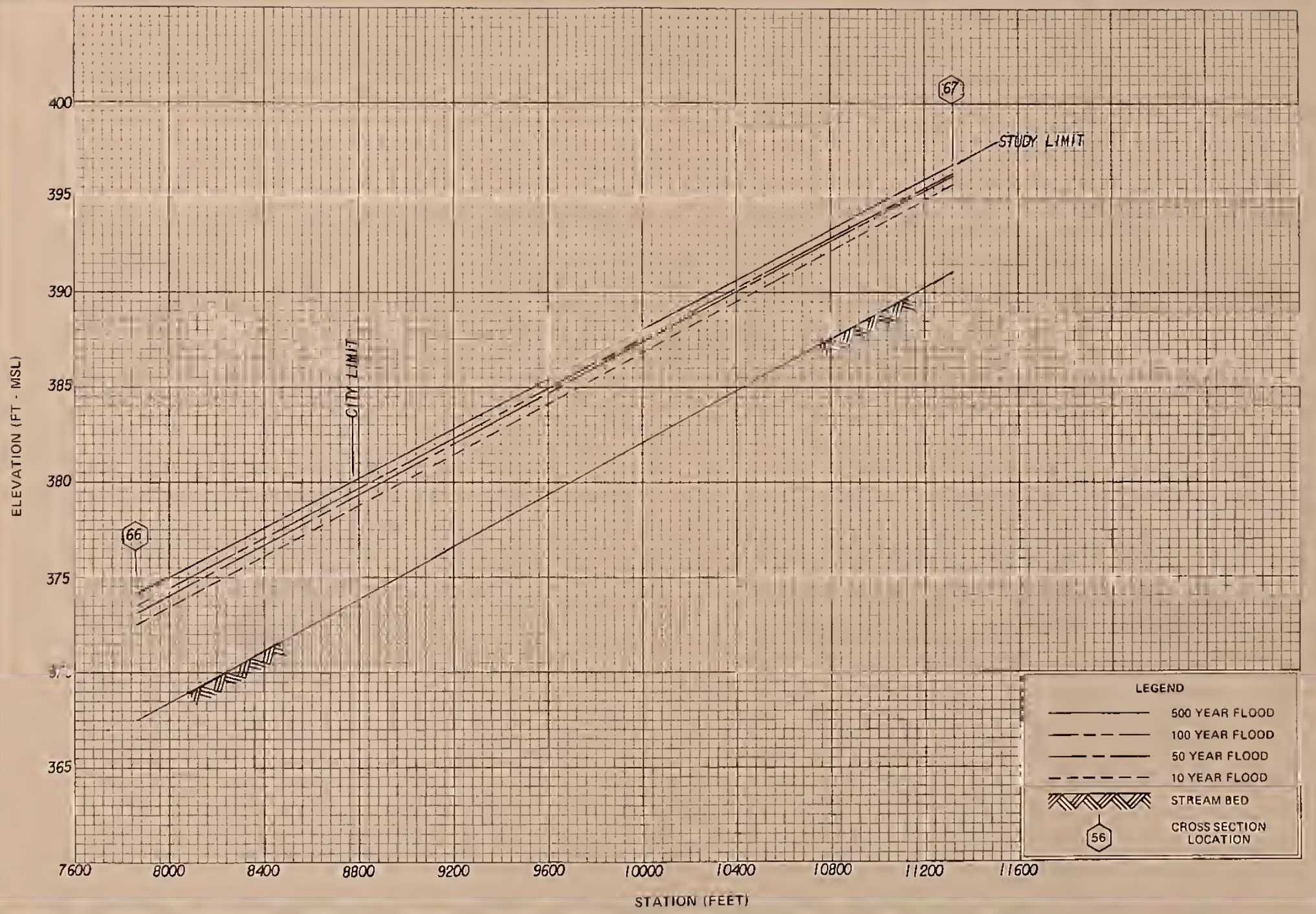


WATER SURFACE PROFILES

ELM BRANCH

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 13 OF 16

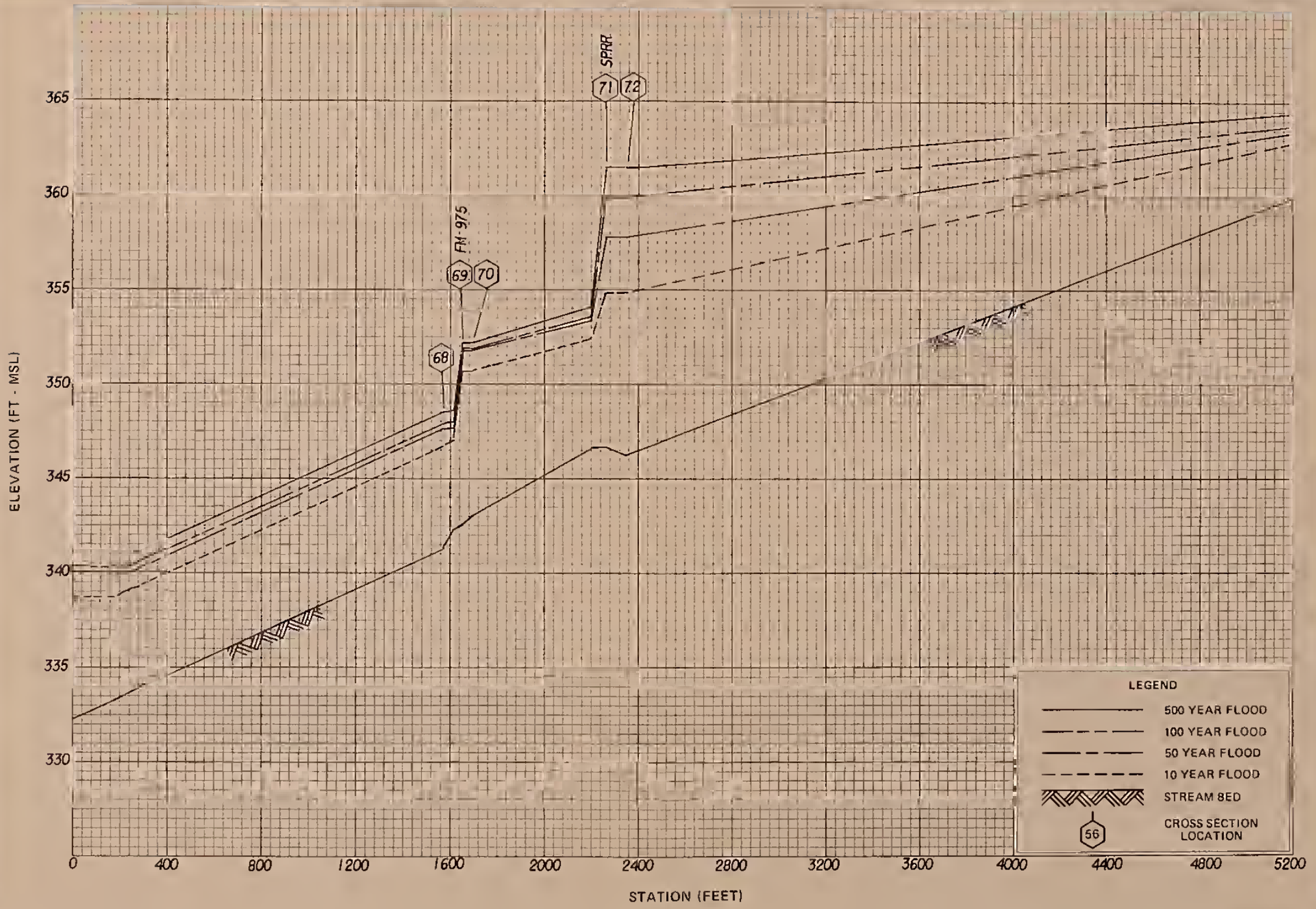


WATER SURFACE PROFILES

ELM BRANCH

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 14 OF 16

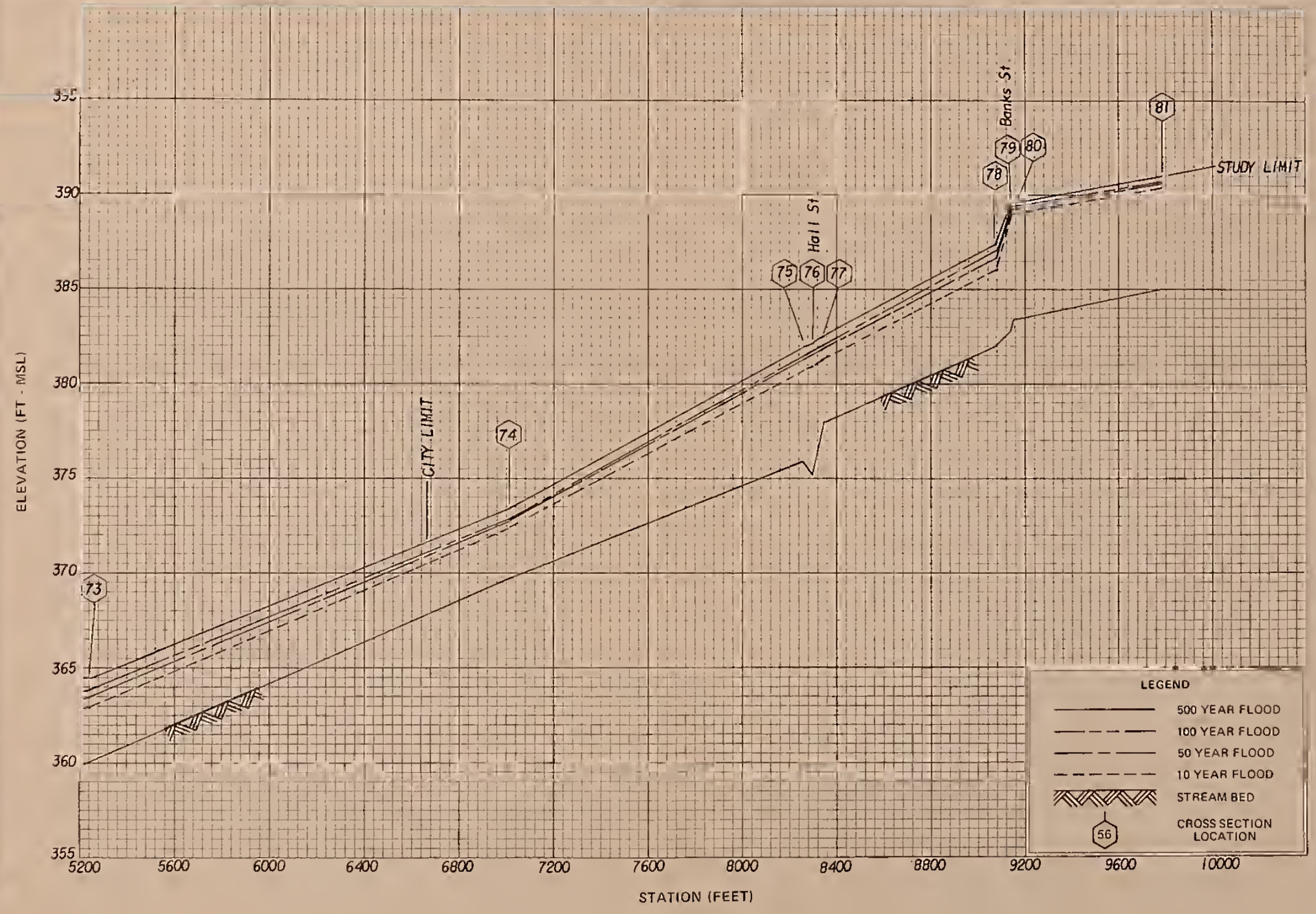


WATER SURFACE PROFILES

ELM BRANCH TRIB 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 15 OF 16



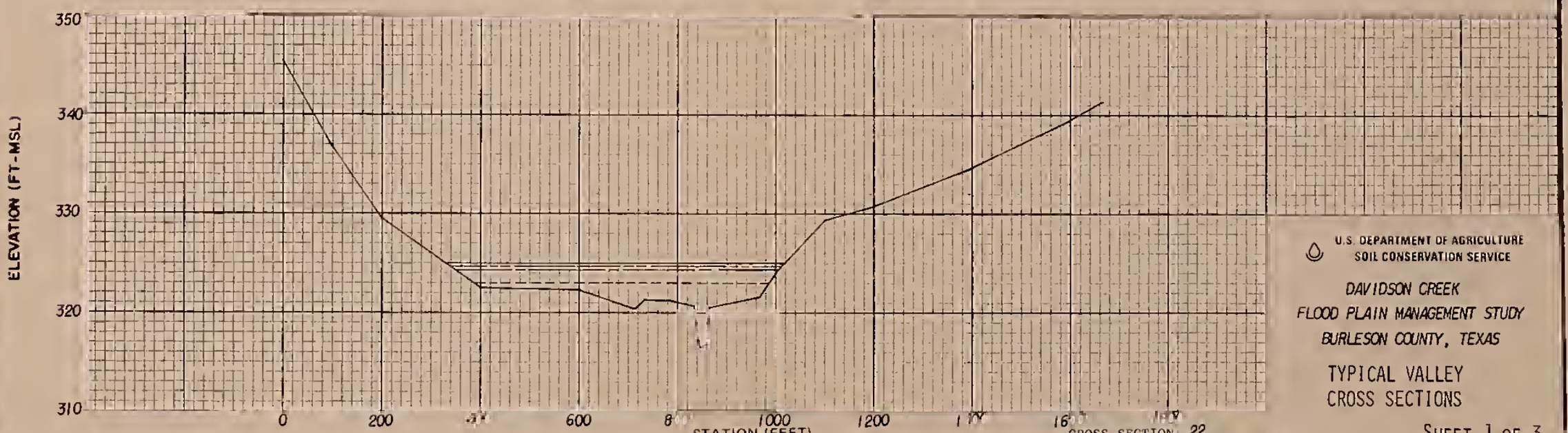
WATER SURFACE PROFILES

ELM BRANCH TRIB 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

SHEET 16 OF 16

CROSS SECTION: 11
STREAM: DAVIDSON CREEK



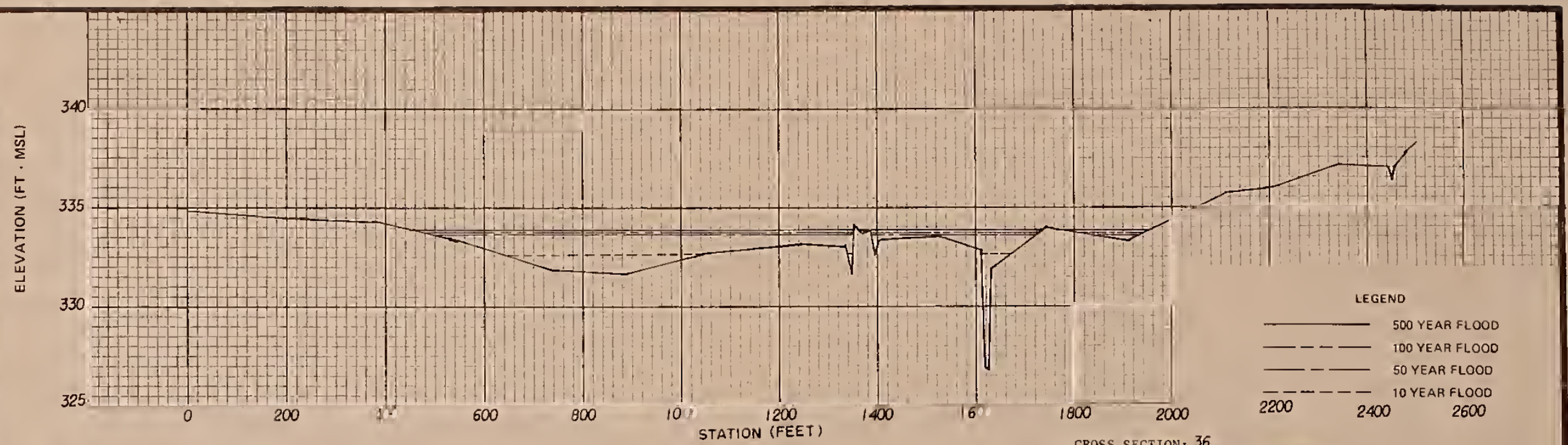
CROSS SECTION: 22
STREAM: DAVIDSON CREEK TRIBUTARY 1

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

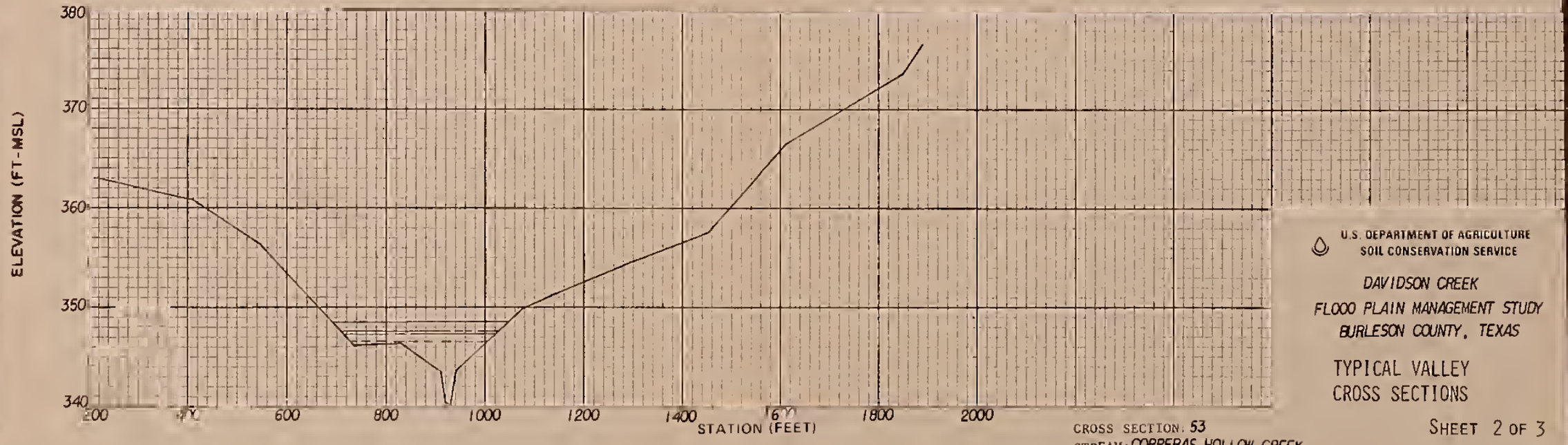
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

TYPICAL VALLEY
CROSS SECTIONS

SHEET 1 OF 3



CROSS SECTION: 36
STREAM: DAVIDSON CREEK TRIBUTARY 2



CROSS SECTION: 53
STREAM: COPPERAS HOLLOW CREEK

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS

TYPICAL VALLEY
CROSS SECTIONS

SHEET 2 OF 3

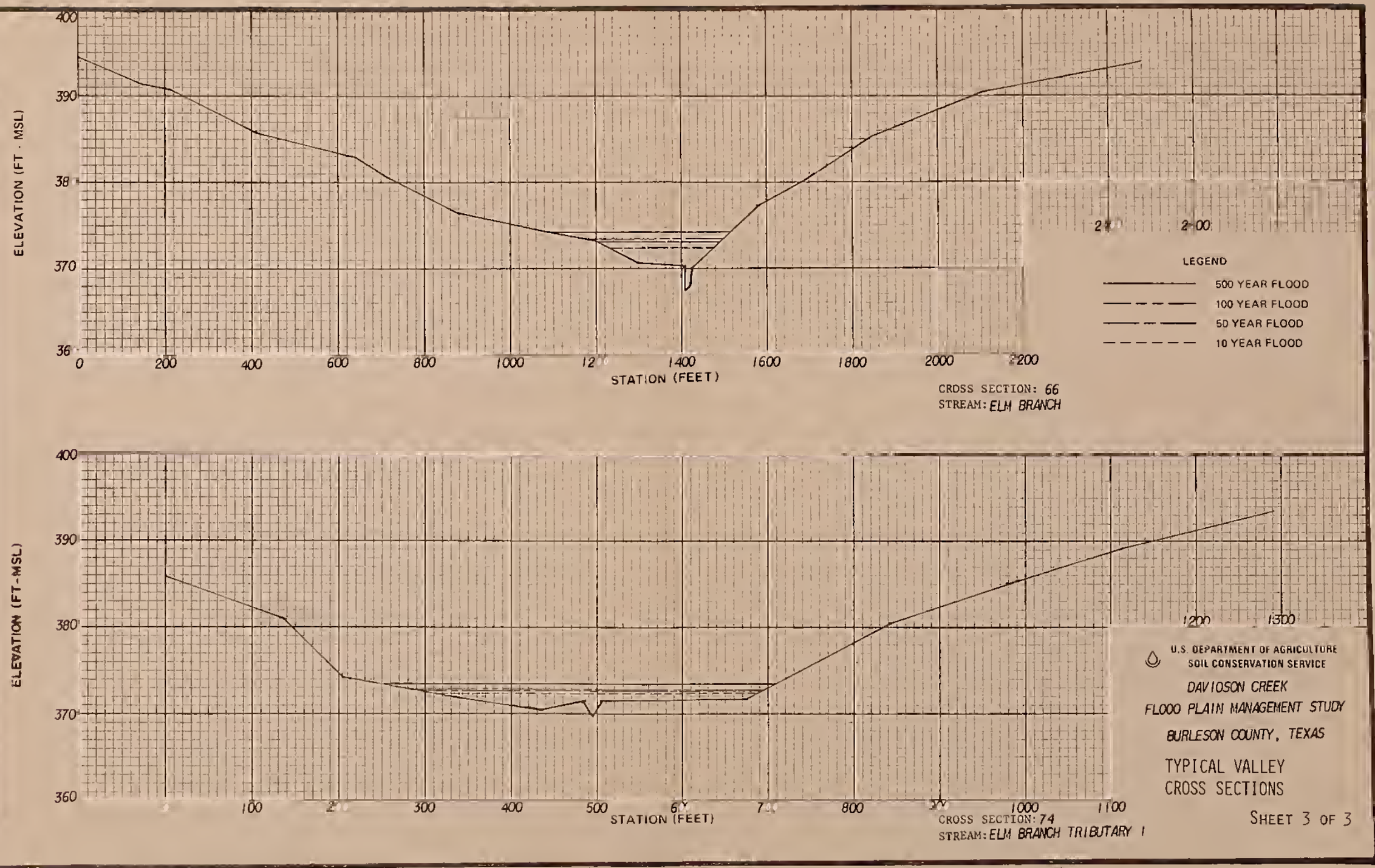

ELEVATION (FT - MSL)
400
390
380
370
360
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
STATION (FEET)
LEGEND
500 YEAR FLOOD
100 YEAR FLOOD
50 YEAR FLOOD
10 YEAR FLOOD
CROSS SECTION: 66
STREAM: ELM BRANCH
ELEVATION (FT-MSL)
100
300
400
500
600
700
800
1000
1100
1200
1300
STATION (FEET)
CROSS SECTION: 74
STREAM: ELM BRANCH TRIBUTARY 1
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
DAVIDSON CREEK
FLOOD PLAIN MANAGEMENT STUDY
BURLESON COUNTY, TEXAS
TYPICAL VALLEY
CROSS SECTIONS
SHEET 3 OF 3

TABLE 2
DAVIDSON CREEK AND TRIBUTARIES
FLOOD PLAIN MANAGEMENT STUDY
ELEVATION AND DISCHARGE TABULATIONS

PRESENT CONDITIONS

Cross Section Number	10-YEAR FREQUENCY			50-YEAR FREQUENCY			100-YEAR FREQUENCY			500-YEAR FREQUENCY		
	Discharge cfs	Elevation M.S.L. Feet	Flood Plain Width Feet	Discharge cfs	Elevation M.S.L. Feet	Flood Plain Width Feet	Discharge cfs	Elevation M.S.L. Feet	Flood Plain Width Feet	Discharge cfs	Elevation M.S.L. Feet	Flood Plain Width Feet
DAVIDSON CREEK												
1	9,658	311.5	1,622	17,320	313.2	1,942	21,106	313.9	2,030	29,735	315.1	2,126
2	9,483	316.4	909	16,998	318.4	1,000	20,711	319.2	1,034	29,172	320.8	1,103
3*	9,420	319.4	1,200	16,879	321.5	1,284	20,562	322.4	1,332	28,959	324.0	1,424
4	9,420	321.3	225	16,879	324.6	244	20,562	326.2	252	28,959	329.4	265
5*	9,420	321.4	1,589	16,879	324.7	2,529	20,562	326.2	2,734	28,959	329.5	2,960
6	9,431	321.7	1,214	16,902	324.9	1,435	20,593	326.4	1,495	29,004	329.6	1,588
7	9,431	322.0	1,483	16,902	325.2	1,610	20,593	326.7	1,640	29,004	329.9	1,705
8	9,431	322.0	1,515	16,902	325.2	1,711	20,593	326.7	1,764	29,004	330.0	1,831
9	9,436	322.2	2,547	16,916	325.4	2,836	20,611	326.8	2,872	29,032	330.1	2,960
10	9,392	322.6	2,374	16,837	325.6	2,658	20,515	327.0	2,741	28,896	330.2	2,917
11*	9,404	324.7	1,239	16,865	327.1	1,366	20,551	328.3	1,427	28,950	331.1	1,808
12	9,404	326.1	304	16,865	329.0	317	20,551	330.4	319	28,950	333.1	2,348
13*	9,404	326.1	1,252	16,865	329.0	1,352	20,551	330.4	1,858	28,950	333.1	2,441
14*	9,400	326.3	1,903	16,858	329.2	2,099	20,544	330.5	2,309	28,940	333.2	2,660
15*	9,373	327.0	1,675	16,813	329.6	1,924	20,489	330.9	2,014	28,864	333.5	2,457
16*	9,279	328.2	2,751	16,639	330.4	3,046	20,275	331.5	3,302	28,558	333.9	3,962
17	9,123	329.2	1,560	16,349	331.3	1,692	19,916	332.3	1,759	28,046	334.5	1,858

* Indicates island flow in the flood plain for one or more storms.

TABLE 2
DAVIDSON CREEK AND TRIBUTARIES
FLOOD PLAIN MANAGEMENT STUDY
ELEVATION AND DISCHARGE TABULATIONS

PRESENT CONDITIONS

Cross Section Number	10-YEAR FREQUENCY Discharge cfs	10-YEAR FREQUENCY Elevation M.S.L. Feet	10-YEAR FREQUENCY Flood Plain Width Feet	50-YEAR FREQUENCY Discharge cfs	50-YEAR FREQUENCY Elevation M.S.L. Feet	50-YEAR FREQUENCY Flood Plain Width Feet	100-YEAR FREQUENCY Discharge cfs	100-YEAR FREQUENCY Elevation M.S.L. Feet	100-YEAR FREQUENCY Flood Plain Width Feet	500-YEAR FREQUENCY Discharge cfs	500-YEAR FREQUENCY Elevation M.S.L. Feet	500-YEAR FREQUENCY Flood Plain Width Feet
DAVIDSON CREEK TRIBUTARY 1												
18	1,353	311.6	453	2,251	313.3	507	2,671	314.0	625	3,652	315.2	812
19	1,317	317.7	146	2,192	318.6	315	2,601	319.1	412	3,556	319.6	510
20	1,317	321.6	0	2,192	323.7	703	2,601	323.9	759	3,556	324.2	844
21	1,317	321.7	723	2,192	323.7	951	2,601	323.9	968	3,556	324.3	1003
22	1,295	323.0	607	2,154	324.3	662	2,557	324.6	675	3,495	325.0	694
23	1,284	325.6	398	2,138	326.4	547	2,538	326.7	601	3,470	327.2	663
24	1,284	328.2	294	2,138	328.9	443	2,538	329.1	476	3,470	329.5	543
25	1,284	328.2	728	2,138	328.9	766	2,538	329.1	778	3,470	329.5	799
26	1,163	333.2	494	1,931	334.0	534	2,290	334.2	546	3,127	334.8	582
27	1,046	342.2	512	1,733	342.8	532	2,054	343.0	557	2,801	343.4	605
28	998	346.2	506	1,651	346.7	554	1,955	347.0	583	2,665	347.4	621
29	998	349.5	51	1,651	350.2	54	1,955	350.9	56	2,665	352.3	62
30*	998	349.5	987	1,651	350.3	1,078	1,955	350.9	1,119	2,665	352.3	1,204
31	821	354.6	173	1,344	355.5	259	1,585	355.8	287	2,153	356.6	373
32	536	363.6	246	857	364.0	263	1,003	364.2	271	1,351	364.6	288

* Indicates island flow in the flood plain for one or more storms.

TABLE 2
DAVIDSON CREEK AND TRIBUTARIES
FLOOD PLAIN MANAGEMENT STUDY
ELEVATION AND DISCHARGE TABULATIONS

PRESENT CONDITIONS

Cross Section Number	10-YEAR FREQUENCY Discharge cfs	10-YEAR FREQUENCY Elevation M.S.L. Feet	10-YEAR FREQUENCY Flood Plain Width Feet	50-YEAR FREQUENCY Discharge cfs	50-YEAR FREQUENCY Elevation M.S.L. Feet	50-YEAR FREQUENCY Flood Plain Width Feet	100-YEAR FREQUENCY Discharge cfs	100-YEAR FREQUENCY Elevation M.S.L. Feet	100-YEAR FREQUENCY Flood Plain Width Feet	500-YEAR FREQUENCY Discharge cfs	500-YEAR FREQUENCY Elevation M.S.L. Feet	500-YEAR FREQUENCY Flood Plain Width Feet
DAVIDSON CREEK TRIBUTARY 2												
33*	633	327.7	390	1,036	329.6	1,546	1,222	330.9	2,413	1,657	333.5	2,510
34	633	329.9	0	1,036	332.5	0	1,222	332.6	0	1,657	333.5	2,690
35*	633	329.9	438	1,036	332.5	2,467	1,222	332.6	2,499	1,657	333.5	2,782
36*	610	332.6	1,023	999	333.6	1,427	1,178	333.7	1,454	1,597	333.9	1,508
37	610	334.1	780	999	334.8	1,354	1,178	335.0	1,462	1,597	335.4	1,772
38*	610	334.6	1,033	999	335.2	1,292	1,178	335.4	1,512	1,597	335.7	1,654
39*	584	339.1	726	956	339.7	786	1,127	339.9	865	1,527	340.1	943
40	584	341.4	285	956	342.0	650	1,127	342.4	1,166	1,527	342.5	1,206
41*	584	341.7	1,058	956	342.3	1,154	1,127	342.4	1,169	1,527	342.7	1,216
42	584	345.1	0	956	345.9	0	1,127	346.1	0	1,527	346.5	0
43*	433	345.1	114	698	345.9	367	819	346.1	397	1,104	346.5	458
44	433	347.9	209	698	348.2	268	819	348.4	308	1,104	348.6	348
45*	433	348.4	110	698	348.9	214	819	349.1	217	1,104	349.3	220
46*	403	351.5	203	648	352.1	221	759	352.3	227	1,023	352.7	239
47	403	353.1	101	648	353.6	152	759	353.8	173	1,023	354.1	204
48*	403	353.3	237	648	353.9	256	759	354.1	262	1,023	354.4	271
COPPERAS HOLLOW CREEK												
49	1,202	335.4	532	1,993	336.1	573	2,363	336.4	597	3,226	337.0	657
50	1,202	337.3	330	1,993	338.2	384	2,363	338.5	650	3,226	339.0	850

* Indicates island flow in the flood plain for one or more storms.

TABLE 2
DAVIDSON CREEK AND TRIBUTARIES
FLOOD PLAIN MANAGEMENT STUDY
ELEVATION AND DISCHARGE TABULATIONS

PRESENT CONDITIONS

Cross Section Number	10-YEAR FREQUENCY Discharge cfs	10-YEAR FREQUENCY Elevation M.S.L. Feet	10-YEAR FREQUENCY Flood Plain Width Feet	50-YEAR FREQUENCY Discharge cfs	50-YEAR FREQUENCY Elevation M.S.L. Feet	50-YEAR FREQUENCY Flood Plain Width Feet	100-YEAR FREQUENCY Discharge cfs	100-YEAR FREQUENCY Elevation M.S.L. Feet	100-YEAR FREQUENCY Flood Plain Width Feet	500-YEAR FREQUENCY Discharge cfs	500-YEAR FREQUENCY Elevation M.S.L. Feet	500-YEAR FREQUENCY Flood Plain Width Feet
COPPERAS HOLLOW CREEK - Cont'd												
51	1,202	337.4	618	1,993	338.3	779	2,363	338.5	815	3,226	339.0	885
52	1,155	344.0	234	1,916	344.9	291	2,271	345.4	322	3,100	346.2	372
53	979	346.6	275	1,611	347.4	307	1,904	347.8	322	2,592	348.5	351
54	940	353.9	59	1,549	355.2	123	1,831	355.6	170	2,493	356.3	251
55	817	359.4	106	1,339	360.5	131	1,579	361.0	142	2,149	361.9	162
56*	613	366.2	40	991	367.6	47	1,164	368.1	49	1,573	369.1	153
57*	540	381.3	443	869	382.3	445	1,019	382.6	447	1,375	383.4	454
ELM BRANCH												
58*	1,550	337.0	88	2,601	338.4	320	3,095	338.8	361	4,244	339.5	437
59	1,055	344.3	233	1,735	345.1	305	2,051	345.3	323	2,792	346.1	404
60	1,055	347.3	276	1,735	347.8	431	2,051	348.0	454	2,792	348.3	488
61	1,055	347.3	505	1,735	347.8	555	2,051	348.0	574	2,792	348.4	613
62	1,016	348.0	270	1,667	348.8	342	1,969	349.1	373	2,678	349.7	434
63**	1,016	351.5	0	1,667	359.6	0	1,969	361.4	2,235	2,678	361.7	2,340
64**	1,016	351.5	458	1,667	359.6	1,649	1,969	361.4	2,690	2,678	361.7	2,805
65	910	360.3	174	1,485	362.4	329	1,752	363.3	403	2,378	363.8	444
66	785	372.5	250	1,276	373.1	289	1,503	373.5	338	2,037	374.1	411
67	549	395.6	171	878	396.2	212	1,028	396.3	218	1,384	396.8	253

* Indicates island flow in the flood plain for one or more storms.
** The 100-year and 500-year storms have common flood plain on Elm Branch and Elm Branch Tributary 1.

TABLE 2
DAVIDSON CREEK AND TRIBUTARIES
FLOOD PLAIN MANAGEMENT STUDY
ELEVATION AND DISCHARGE TABULATIONS

PRESENT CONDITIONS

Cross Section Number	10-YEAR FREQUENCY Discharge cfs	10-YEAR FREQUENCY Elevation M.S.L. Feet	10-YEAR FREQUENCY Flood Plain Width Feet	50-YEAR FREQUENCY Discharge cfs	50-YEAR FREQUENCY Elevation M.S.L. Feet	50-YEAR FREQUENCY Flood Plain Width Feet	100-YEAR FREQUENCY Discharge cfs	100-YEAR FREQUENCY Elevation M.S.L. Feet	100-YEAR FREQUENCY Flood Plain Width Feet	500-YEAR FREQUENCY Discharge cfs	500-YEAR FREQUENCY Elevation M.S.L. Feet	500-YEAR FREQUENCY Flood Plain Width Feet
ELM BRANCH TRIBUTARY 1												
68	828	346.7	120	1,338	347.6	196	1,572	347.9	221	2,128	348.5	323
69	828	350.7	0	1,338	351.8	470	1,572	351.9	486	2,128	352.2	560
70	828	350.7	424	1,338	351.8	546	1,572	351.9	555	2,128	352.2	583
71**	686	354.8	0	1,097	357.8	0	1,286	359.9	2,235	1,734	361.5	2,340
72**	686	354.9	391	1,097	357.8	653	1,286	359.9	2,690	1,734	361.5	2,678
73	653	363.0	332	1,047	363.5	347	1,227	363.9	359	1,655	364.5	378
74	611	372.4	373	981	372.8	406	1,149	372.9	414	1,550	737.4	455
75*	410	380.7	129	647	381.3	148	754	381.5	173	1,010	382.0	203
76	410	380.9	107	647	381.5	137	754	381.7	146	1,010	382.2	169
77	410	381.2	110	647	381.8	146	754	382.0	158	1,010	382.5	188
78	354	386.0	38	556	386.6	68	646	387.0	139	864	387.4	217
79	354	389.0	0	556	389.3	0	646	389.4	341	864	389.6	390
80	354	389.0	338	556	389.3	402	646	389.4	424	864	389.6	458
81	273	390.4	374	424	390.6	387	491	390.7	394	653	391.0	412

* Indicates island flow in the flood plain for one or more storms.
** The 100-year and 500-year storms have common flood plain on Elm Branch and Elm Branch Tributary 1.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
1	204	395.54	A Railroad spike in power pole No. 75-A at northeast corner of gravel road overpass in north side of railroad R.O.W.
1	208	393.70	A Railroad spike in power pole on east side of County Road No. 208; 0.35 mile south of SH-21.
1	212	360.78	A railroad spike in north end of west 7 bents on railroad bridge 0.4 mile west of County Road 208.
2	202	344.05	A railroad spike in southeast corner post on west side of gravel road at old well site, 0.57 mile north of FM 166 on road to new high school.
2	203	374.17	A railroad spike in northeast corner post at southwest corner of intersection of the Southern Pacific Railroad and gravel road to new high school.
2, 3	22	354.20	Top of concrete R.O.W. monument in southwest quadrant of intersection of FM 166 and FM 3058, approximately 48 feet west of the centerline of FM 3058, in corner of chain link fence.
2, 3	209	368.13	A railroad spike in power pole No. 37 on the south side of FM 166 and 0.5 mile east of FM 3058.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
2, 3	210	355.80	A square cut in the southeast corner of south headwall on FM 166 and 0.8 mile east of intersection of FM 3058.
3	200	339.00	A railroad spike in power pole No. 77 at southeast corner of entrance to trailer park on FM 3058; 0.6 mile southeast of FM 166.
3	201	318.50	Approximately 0.4 mile southeast along FM 3058 from its intersection with FM 166 to Davidson Creek Tributary No. 1, a square cut in the northwest corner of west headwall of bridge.
3, 4	217	330.29	From intersection of FM 166 and FM 3058 southeast, 0.7 mile along FM 3058, thence south 0.2 mile along gravel road, a railroad spike in north side of power pole on west side of road.
7	18	374.25	Top of fire hydrant in northeast quadrant of intersection of Buffalo Street and Main Street.
7	19	339.68	Top of fire hydrant in northwest quadrant of intersection of Buffalo Street and SH-36, just east of concrete parking pad.
7	20	320.61	A railroad spike driven flush with asphalt pavement in the centerline of FM 166 at east end of Davidson Creek bridge.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
7	USC&GS BM 392	392.020	At Caldwell, Burleson County, at the county courthouse, in front of the building, and in a flower bed, a standard disk, stamped "CALDWELL 1933" and set in the top of a concrete post (119.488 meters or 392.020 feet).
7	211	328.15	A railroad spike in south side of power pole on north side of FM 166; 0.4 mile west of intersection with FM 3058.
7, 11, 12	523	343.92	Top of fire hydrant in northeast quadrant of intersection of Main Street and SH-21.
8	214	342.14	Top of concrete highway R.O.W. monument on north side of SH-21, approximately 0.8 mile east of intersection of SH-21 and Highway 36; 300 feet west of culvert.
8	15	332.28	Top of west bolt on base of street light in southeast quadrant of intersection of SH-21 and Highway 36.
10	213	330.06	A railroad spike in power pole No. 1412; 200 feet southwest of bridge, 0.4 mile from Highway 36 on Poor Farm Road.
11	16	337.66	On north side of metal base plate of light pole at northeast corner of Wal-Mart parking lot.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
11	17	342.59	Top of fire hydrant at Sunny and Lewis Streets.
12	218	409.31	A square cut on west end of south headwall at railroad tracks and SH-21 east of Broadway.
12	502	357.84	A square cut on top of south wing of west headwall at northwest corner of Alligator and North Thomas Streets.
12	504	408.64	Top of fire hydrant at northeast corner of West Fox and North Stone Streets across from Woodson Lumber Company.
12	506	409.01	A square cut on southeast corner of concrete slab of lift station on Old San Antonio Road and Pine Street, approximately 300 feet east of railroad.
12, 13	113	404.79	Top of fire hydrant at intersection of West 8th Street and North Banks Street.
12, 13	508	408.37	A square cut on top of east headwall on south side of SH-21 at North Hall Street.
13	509	422.55	A square cut on top of southeast corner of headwall on south side of SH-21 at intersection of SH-21 and Hull Street.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
13	7-A	378.98	A railroad spike in centerline of the west end of 8th Street, approximately 40 feet east of east creek bank.
13	220	396.46	Approximately 0.6 mile southeast along Hull Street from SH-21, a railroad spike in power pole 65 feet south of hanger at airport.
13	221	384.14	A railroad spike in power pole with beacon light at airport.
13	223	381.38	A square cut in southeast corner of Nagle Wire Manufacturing Company building, 10 feet west of the centerline of railroad tracks at south end of 10th Street.
14	224	349.45	A square cut in south end of west headwall, 0.5 mile south of railroad overpass on FM 975.
16	110	397.53	A square cut on east end of south headwall; 50 feet west of Woodson Drive.
16	215	426.25	A railroad spike in power pole with transformer No. 77359; 50 feet south of centerline of SH-21 and south of intersection of SH-21 and County Road 102.
16, 17	219	433.87	A square cut on north end of reinforced concrete pipe on west side of County Road 102; 0.45 mile north of intersection with SH-21.

TABLE 3

BENCH MARK DESCRIPTIONS AND ELEVATIONS

FLOOD PLAIN MANAGEMENT STUDY

DAVIDSON CREEK AND TRIBUTARIES

BURLESON COUNTY, TEXAS

Flood Hazard Area Sheet Number	RM Name	Elevation (Ft. MSL)	Description
17	216	410.61	A railroad spike in a power pole 50 feet from the curve in County Road 102 and approximately 0.8 mile north of intersection with SH-21.